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ABSTRACT

This report describes the outcome of a study by the National Academy of Sciences of the career outcomes of the persons who received fellowships between 1959 and 1973 under NDEA Title IV. Follow-up on those persons who received fellowships was done by means of the data banks in the Commission on Human Resources (CHR) of the National Research Council. No special data collection was attempted for this purpose because the resources within the CHR provided information on substantial and usually representative samples of the basic population. Criteria of career achievement are identified as: attainment of the doctorate; becoming a faculty member; achieving dissertation advisor status; migration from Ph. D. institution to employment; winning of research grants; employment after doctorate; publications and citations in the scientific literature; limitations of publication and citation counts as career criteria; and geographic distribution. The nature of the CHR data and the extent to which data were available on this fellowship holding population are described. Data on career outcomes are tabulated, and occasionally interpreted in graphic displays. Comparative sex and salary differences as well as data on the whole population of Ph. D.'s are presented, but no statement of policy implications is attempted. (SPG)

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Career Achievements of NDEA (Title IV) Fellows of 1959-1973

A Report to the U.S. Office of Education

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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by the

Commission on Human Resources

HE 009 704

CAREER ACHIEVEMENTS of
THE NATIONAL DEFENSE EDUCATION ACT (Title IV) FELLOWS of 1959-1973

Lindsey R. Harmon

Project Director

A Report to the

UNITED STATES OFFICE of EDUCATION

by the

Commission on Human Resources

NATIONAL RESEARCH COUNCIL

NATIONAL ACADEMY OF SCIENCES

1977

NOTICE

This report is based on research conducted by the National Research Council with the support of the U.S. Office of Education, the National Endowment for the Humanities, and the National Science Foundation under Contract Number NSF-C310, Task Order 314. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author and do not necessarily reflect the views of the sponsoring agencies.

Preface

In the National Defense Education Act of 1958, Title IV and its later amendments provided support for over 45,000 persons under fellowships administered by the U.S. Office of Education. A follow-up of NDEA Title IV Fellows in 1968 by the Bureau of Social Science Research, Inc. provided the first information on the attainment of doctorate degrees by these Fellows. In 1975 the Office of Education, through the National Science Foundation, asked the National Academy of Sciences to make a more extensive study of the career outcomes of the Title IV Fellows. The present report describes the results of this study. No attempt is made in this report to make policy recommendations; the report is purely factual, and concerned solely with career outcomes that could readily be ascertained.

This study was conducted under the guidance of a panel composed of members of the Board on Human-Resource Data and Analyses and the Board on Fellowships and Associateships, which operated from 1974 to 1977 under the Commission on Human Resources. We are indebted to this panel, and particularly to its chairman, Lee Grodzins, for their work in guiding preparation of this document. We are also deeply indebted to Gertrude Cox for her meticulous work in reviewing the first draft of the report and offering many valuable suggestions for revision, and to Robert R. Raymo for his suggestions. The study was designed and carried out by Lindsey R. Harmon, Project Director, who was ably assisted in the work by Norma Melendez and Susan Henry, and by the Data Processing Office under the direction of Herbert Soldz, for preparation of extensive data collations and tabulations. We are greatly indebted to them for bringing this work to completion.

Harrison Shull
Chairman
Commission on Human Resources

September, 1977

HIGHLIGHTS

Title IV of the National Defense Education Act of 1959 supported 45,829 graduate Fellows for varying amounts of time up to 3 years, over the period 1959-1973. Title IV was intended to alleviate the then existing and projected shortage of college teachers, and to achieve a wider geographic spread of strong graduate programs.

- Approximately half of the male NDEA Fellows and one fourth of the female Fellows (49.2% and 23.5%) of 1959-1972 had attained doctorates by 1974, the cut-off date for follow-up in the present study.
- Approximately one fourth of the male Fellows and one eighth of the female Fellows (26.3% and 13.6%) could be identified as faculty members in U.S. colleges and universities in 1975. Because of problems of identification, these are probably underestimates.
- About 2.6% of the male Fellows and 0.4% of the female Fellows had by 1974 become dissertation advisers of PhD's who had graduated up to that time.
- The baccalaureate-to-doctorate time lapse for male NDEA Fellows averaged about 7.0 years; for the female Fellows 8.4 years. These figures vary substantially by field and graduation cohort, but are generally lower than the average for all PhD's by about 20%, where comparable data are available.
- Of the NDEA Fellows attaining doctorate degrees, the proportions planning to take postdoctoral training were generally comparable to those of all PhD's of the same fields and same graduation cohorts.
- Of NDEA Fellows who were supported in science fields in 1963-1966, 1.9% won support through research grants from NSF or NIH by 1972 in a competition judged by their scientific peers.
- Although 90% of NDEA Fellows who attained doctorates did so in departments within the Roose-Andersen (R-A) rating system, only about 15% of Fellows with doctorates could be identified as faculty members in R-A rated departments in 1975, while 28% were in unrated departments. Although both of these percentages are lower-bound figures, they document a massive--and inevitable--movement toward the unrated departments, many of them in non-PhD-granting institutions.
- Of NDEA Fellows who took doctorates in science and engineering fields, only 1.3% were found in follow-up in 1973 and 1975 to be unemployed; another 1 3/4% were found to be part-time employed. Of those employed, 64.7% were in educational institutions in 1973; in 1975 the academic proportion dropped to 60.0%.

- The second most frequent employer category for the science/engineering PhD's among NDEA Fellows is business and industry, roughly comparable to that of the general population of PhD's in science and engineering fields.
- The primary work activity of science and engineering PhD's who had been NDEA Fellows was teaching for 47% in 1973 and 43% in 1975, reflecting the shift from academic to nonacademic employment noted above. Other work activity categories show a corresponding shift toward industrial/commercial types of activity.
- Over half (56.8%) of science and engineering NDEA Fellows who took doctorates in the early 1960's had published in the scientific literature by 1972, for a group average of 4.9 papers each. For those who graduated in the late 1960's, 45.2% had published, with a group average of 2.2 papers. Those graduating in the 1970's had little time to publish by 1972, but 29.6% did so; the average was 1.1 papers each for this group. Even 11.1% of those without doctorates published; the average for this group was 0.4 papers each.
- Inter-regional migration of NDEA Fellows shows net shifts parallel to, but stronger than those of PhD's in general. The overall pattern was migration from the northeast toward the south, with the South Atlantic states as the largest net gainer at each successive career stage from baccalaureate to doctorate to post-PhD employment.

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CAREER ACHIEVEMENTS OF THE NATIONAL DEFENSE EDUCATION ACT (Title IV) FELLOWS OF 1959-1973

The National Defense Education Act of 1958. The National Defense Education Act of 1958, according to a report published in 1971 by the Department of Health, Education, and Welfare,* was, under its Title IV, "...intended to alleviate an existing and projected shortage of qualified college teachers. This was to be achieved by means of awarding 3-year fellowships for full time study to doctoral candidates interested in college teaching, by institutional allowances for strengthening graduate programs, and by a wider geographic distribution of strong graduate programs."

The extent of the activities carried out under Title IV is perhaps best described in a further quotation from the 1971 report: "During the first 10 years of the Title IV program, over a third of a billion dollars has been expended in support of 26,828 graduate fellowships. Over half of this amount has gone to students in the form of stipends and family allowances; the remainder has been paid to the institutions at which the fellows have been enrolled. The number of new fellowships awarded annually began with 1,000 in the fall of 1959, and continued with 1,500 for the next 5 years. There followed a period of rapid expansion, when the number increased to 3,000 in 1965, and again to 6,000 in 1966 and 1967. Since 1967 the number has again declined to about 3,000 a year."

The number of individuals supported is actually more than the number of fellowships, because, when a fellowship is vacated, it was typically (after 1963) reassigned to another individual. It is thus that the total number of individuals supported by the Title IV Fellowships was, according to the tabulations from the consolidated tape record, 45,829 for the entire period through 1973. Some of these persons were supported for the full three years provided by the program; others were supported for shorter lengths of time. There was not time nor funds in the present project to make a differential study of the achievements of those supported for varying lengths of time; all NDEA Fellows, from the standpoint of this report, are treated alike in the tabulations. All of the data in this report concern Title IV Fellows only.

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*NDEA Fellowships for College Teaching, by Clarence B. Lindquist. U.S. Department of H.E.W., Washington, D.C. 1971 (OE-55058).

A Previous Study. For an account of the history of the Title IV program, including administrative arrangements, geographical dispersion, and an earlier report of the outcomes of the program, the reader is referred to the 1971 report by Lindquist. An earlier study, covering the first 4 years of the program, was made in 1968 by the Bureau of Social Science Research.*

The Present Report. This report concerns all the persons awarded NDEA Title IV Fellowships over the life of the program from 1959 through 1973. Whenever a year of fellowship is used, it refers to the year of first award, in the event that more than one award was made. Follow-up was done by means of the data banks in the Commission on Human Resources (CHR) of the National Research Council. No special data collection was attempted for this purpose, because of the fact that the resources within the CHR provide information on substantial and usually representative samples of the basic population. The nature of the CHR data, and the extent to which data were available on this fellowship holding population will be described. Data on career outcomes will be tabulated, and occasionally interpreted in graphic displays. Wherever possible, comparative data on the whole population of PhD's will be presented, but no statement of policy implications will be attempted.

Criteria of Career Achievement

1. Attainment of the Doctorate. The first step in the career of a graduate fellow that can be evaluated as a measure of success is the attainment of the doctorate. This is noted via the Doctorate Records File of the CHR, which has been maintained for many years by the CHR under the sponsorship of a number of government agencies. This file (DRF) contains the names of all PhD's (or holders of equivalent third level degrees) from United States universities from 1920 to the present. (Year, throughout this report, means calendar year.) The record for each PhD contains information on all degrees held, including the institution granting the degree, the field, and the year in which granted. For all persons graduating since 1957--which would include all of the NDEA Title IV Fellows--there is extensive information about plans for the year immediately following graduation, family background, citizenship, etc. The main use of the DRF for this report, however, will be to

* Laure M. Sharp, Study Director, Study of NDEA Title IV Fellowship Program, Phase I (Contract OEC-1-071052-2808) Washington: Bureau of Social Science Research, Inc. March 1968.

tabulate the achievement of the first step after the award of the fellowship--the attainment of the doctorate.

2. Becoming a Faculty Member. The National Faculty Directory provides an "outside" source of information about academic employment of former NDEA Fellows. This directory, available in both book and computer tape form, is assembled by a private organization, and is published yearly. It attempts to include all the faculties of U.S. institutions of higher education, compiled from the catalogs of the institutions, and includes, together with the name, the institution and department of all faculty included. Although there may be omissions and even some errors in the tape transcription, this source of data provides very usable statistics regarding aggregations of individuals.

3. Achieving Dissertation Adviser Status. Some of the NDEA Fellows eventually become advisers of PhD candidates in United States universities. Those who do are noted in the Dissertation Adviser File of the CHR, an outgrowth of the DRF. This is made possible by the fact that each new PhD lists the name of his dissertation adviser; these names are then collected into a single file, which provides the career information sought.

4. Migration from PhD Institution to Employment. For those who enter academic employment, a measure of the shift from graduate institution to institution of employment is provided by use of the Roose-Andersen (R-A) ratings published by the American Council on Education in 1970 (see A Rating of Graduate Programs).* These departmental ratings apply only to doctorate-granting departments; departments which only recently began granting doctorates are not included; four-year colleges and masters-only institutions also are not included. Use of these ratings thus serves to quantify the inevitable movement of the majority of PhD graduates out of the rated category of institutions into those which have not been rated. To perform this analysis, a tape with the R-A ratings was collated with the CHR tapes which indicated departments (inferred from field of PhD) of graduation and departments of employment (from the National Faculty Directory) for those who were academically employed. By comparing the frequency of the rated departments in the two

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* These ratings represent a summary of the assessments provided by 4000 faculty members in 37 disciplines at 131 major institutions. In the Roose-Andersen scale, 5.00 is the highest possible score; 4.01-5.00 means "Distinguished"; 3.01-4.00 means "Strong"; 2.51-3.00 means "Good"; and 2.00-2.50 means "Adequate Plus".

sources, and the mean rating of those departments within the scope of the Roose-Andersen system, it is possible to chart the movement from the granting of the doctorate to later employment.

5. Winning of Research Grants. The National Institutes of Health and the National Science Foundation award grants in aid of research on a competitive basis, on the strength of peer judgments of the worthiness of the proposed research. A computer tape was secured from each of these agencies, the two tapes were merged, and then searched for data on the award of research grants to the NDEA Fellows. The available data tape from these two sources was not complete; it covered grants by the NSF for the period 1967-1972, and for the NIH the years 1962-1971. Despite its limitations of coverage, it does provide one additional index of career achievement for these Fellows. There are, of course, other sources of research support, but these were the only lists available at the time this study was done.

6. Employment after the Doctorate. For those who attain PhD's, whether or not they enter academic employment, it is possible to determine (for a carefully selected sample) important information with respect to later employment, such as employer category, primary work activity, and salary. This was done by reference to the Comprehensive Roster of Doctoral Scientists and Engineers, which is maintained by the CHR under the sponsorship of the NSF, with the assistance of other government agencies. To ascertain the employment data, a representative sample of persons included in the Comprehensive Roster is followed up each two years and current employment and related data are requested. The Comprehensive Roster thus became the source for a number of the data tables in the present report, but only for the scientists and engineers.

7. Publications and Citations in the Scientific Literature. No single index of achievement can be taken as entirely satisfactory; each must be viewed as partial data. For the scientific segment of the NDEA Fellow population, one of the items of considerable importance is the matter of publications in the scientific literature, and citations to one's publications by other scientists. Both of these kinds of data are available through the publications of the Institute for Scientific Information (ISI) in the Publications Index and Science Citation Index, both of which are available in computer tape form. This survey of scientific literature includes a very large and inclusive segment of the world's scientific literature.

Limitations of Publication and Citation Counts as Career Criteria. A limitation on the use of this data source is that the names of authors are truncated in the ISI data, to just the last name and first and second initials. This complicates the matter of identification, as there are a great many authors with identical names, particularly when so truncated. To avoid the mistakes of erroneous attribution, the names in the CHR files (which included over a half million PhD's and MD's) were truncated in a manner identical with that of the ISI data, and duplicates eliminated. Only unique names, i.e. those appearing only once in the half million CHR names, were included for matching with the ISI files. In the latter files, of course, the same individual might appear any number of times, depending on his publications and the number of times he is cited. This restriction to unique names reduced the number of cases followed up through this source to about half of the original total, but there is no reason to believe that this constitutes a biased sample from the standpoint of the kind of data here concerned. For the ISI follow-up data, the publications over the 12 year period 1961 to 1972, inclusive, were used. Another limitation of these data is that only first-named authors are included. This is an important limitation when individuals are concerned, but its effect on aggregations, such as the present statistics, is minimal. The same procedure, and the same limitations, applies to the proportions cited in the scientific literature; the data derived are nevertheless considered as a good estimation of the citations of all NDEA Fellows. The period covered, 1961-1972, is not necessarily optimal for this particular group, but it constituted the available data source, and as such was considered to afford useful, if limited measures of career achievement.

Geographic Migration. In addition to the above measures of career achievement, an analysis was made to determine changes in geographic distribution, to measure regional shifts from the baccalaureate to doctorate to post-PhD career stages. One of the objectives of the National Defense Education Act was to try to achieve a better geographic distribution of doctorate-holders. The analysis was made to determine the proportions of the NDEA Title IV Fellows in each geographic region at each career stage, in comparison with that of PhD's in general.

ACHIEVEMENT OF CAREER CRITERIA BY NDEA FELLOWS

Attainment of Academic Criteria The percentage of NDEA Fellows, by year of first fellowship award, by sex, who attained the PhD by 1974 (the cut-off date for the present study) is shown in Table 1, and portrayed graphically in Figure 1. Table 1 also provides data on the attainment of faculty status in a United States college or university, as shown by inclusion in the National Faculty Directory. Finally, Table 1 shows attainment of dissertation adviser status. All of these academic achievement criteria are shown by sex and fellowship award cohort, i.e. the year of first NDEA Fellowship award. The right-hand column shows the total of all award cohorts combined. Here one notes that 49.2% of the men and 23.5% of the women attained doctorates, that 26.3% of the men and 13.6% of the women became faculty members, and that 2.6% of the men and 0.4% of the women became advisers of students who attained doctorates by 1974.

It is readily apparent, as is to be expected, that the percentage of the Fellows attaining each of these criteria varies by year of award, as the earlier Fellows have had more time for achievement. For the oldest award cohorts, about 2/3 of the men and 1/3 of the women had attained the doctorate by 1974, from 35% to 40% of the men and 15% to 20% of the women had entered faculty positions, and about 10% of the men and 1% to 2% of the women had become dissertation advisers. Data for the two sexes are combined at the bottom of Table 1. The proportions of men and of women who attain these three criteria are shown graphically in Figure 2, by three award cohorts.

Detail by field and sex For the earliest years of award of NDEA Fellowships, field of award was not available. Beginning in 1963, however, the field of award was given, and the data for two award cohorts, 1963-1966 and 1967-1973, and the total for these two periods, are given in Table 2 for PhD attainment, in Table 3 for faculty status, and in Table 4 for dissertation adviser status. The fields are listed down the page, using the same rubrics that are customary for the Doctorate Records File. At the bottom of the page, cohort data are given for the total of all known fields. Separate sets of columns are provided for the data for men and for women, and for both sexes combined, within field groups. It would be interesting to compare these data with those for the total group of graduate students, but such data are not readily available, and could not be produced within the resources allocated to this project.

Table 1

Career Achievements of NDEA Fellows, by Year of First Award and Sex: Doctorate Attainment by 1974; Attainment of Faculty Status; Attainment of Dissertation Adviser Status in U.S. Universities

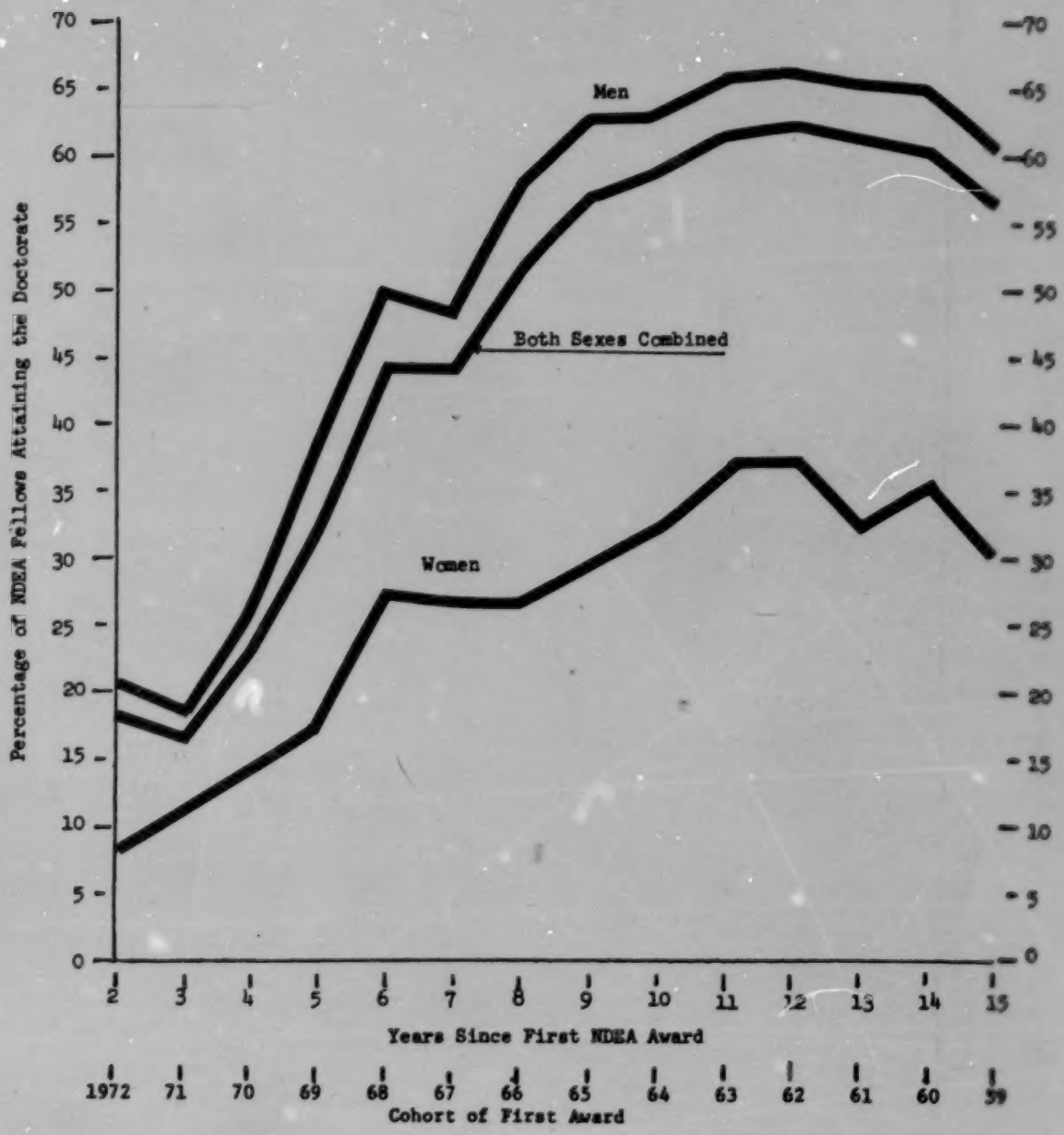
		Year of Fellowship Award														
		1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 -73	Total
MEN	N	865	1286	1309	1303	1284	1278	2804	5206	5737	5297	3804	2605	2511	665	35954
PhD	N	527	835	856	865	848	809	1763	3009	2780	2645	1458	675	472	139	17681
	%*	60.9	64.9	65.4	66.4	66.0	63.3	62.9	57.8	48.5	49.9	38.3	25.9	18.8	20.9	49.2
Faculty Member	N	312	498	508	465	516	477	1023	1615	1510	1330	670	309	201	30	9464
	%	36.1	38.7	38.8	35.7	40.2	37.3	36.5	31.0	26.3	25.1	17.6	11.9	8.0	4.5	26.3
Adviser	N	95	133	131	104	89	63	107	99	75	42	10	--	--	--	948
	%	11.0	10.3	10.0	8.0	6.9	4.9	3.8	1.9	1.3	.8	.3				2.6
WOMEN	N	134	214	188	223	215	222	593	1318	1446	1770	1513	855	989	193	9875
PhD	N	40	76	61	83	79	71	173	350	386	483	262	125	112	16	2317
	%	29.9	35.5	32.4	37.2	36.7	32.0	29.2	26.6	26.7	27.3	17.3	14.6	11.3	8.3	23.5
Faculty Member	N	24	34	27	38	45	40	113	205	245	288	157	66	57	4	1343
	%	17.9	15.9	14.4	17.0	20.9	18.0	19.1	15.6	16.9	16.3	10.4	7.7	5.8	2.1	13.6
Adviser	N	1	6	2	4	6	1	2	5	3	5	2	--	--	--	37
	%	.7	2.8	1.1	1.8	2.8	.5	.3	.4	.2	.3	.1				.4
BOTH SEXES	N	999	1500	1497	1526	1499	1500	3397	6524	7183	7067	5319	3460	3500	858	45829
PhD	N	567	911	917	948	927	880	1936	3359	3166	3128	1720	800	584	155	19998
	%	56.8	60.7	61.3	62.1	61.8	58.7	57.0	51.5	44.1	44.3	32.3	23.1	16.7	18.1	43.6
Faculty Member	N	336	532	535	503	561	517	1136	1820	1755	1618	827	375	258	34	10807
	%	33.6	35.5	35.7	33.0	37.4	34.5	33.4	27.9	24.4	22.9	15.5	10.8	7.4	4.0	23.6
Adviser	N	96	139	133	108	95	64	109	104	78	47	12	--	--	--	985
	%	9.6	9.3	8.9	7.1	6.3	4.3	3.2	1.6	1.1	.7	.2				2.1

* % stands for percentage of total, by sex group, within year of award.

SOURCE: NRC, Commission on Human Resources

Figure 1

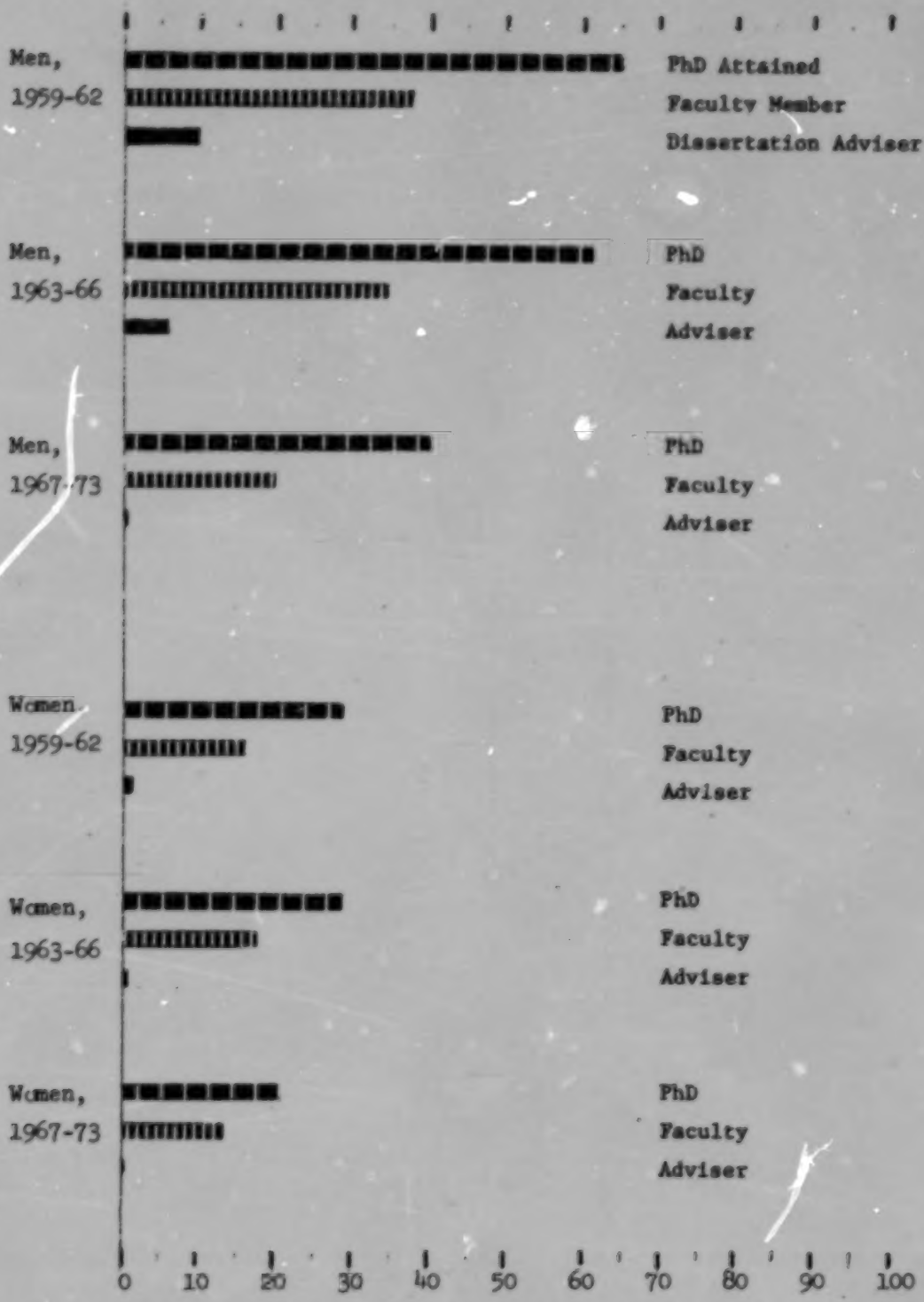
Percentage of NDEA Fellows Attaining the Doctorate by 1974, by Cohort and Sex



SOURCE: NRC, Commission on Human Resources

Figure 2

Proportions of NDEA Fellows Attaining Three Criteria of Career Achievement



SOURCE: NRC, Commission on Human Resources

Table 2

NDEA Fellows of 1963-1973, by Cohort of First Award:
Percent Attaining PhD's by 1974, by Field, Sex & Cohort

Field of Application		MEN 1963-66	MEN 1967-73	MEN Total	WOMEN 1963-66	WOMEN 1967-73	WOMEN Total	BOTH SEXES 1963-66	BOTH SEXES 1967-73	BOTH SEXES Total
Mathematics	N*	538	961	1499	52	238	290	590	1199	1789
PhD Attained	%	62.3	43.1	50.0	26.9	12.6	15.2	59.2	37.0	44.3
Physics	N	625	1064	1689	22	74	96	647	1138	1785
PhD Attained	%	68.8	41.1	51.3	40.9	16.2	21.9	67.9	39.5	49.7
Chemistry	N	577	1124	1701	82	218	300	659	1342	2001
PhD Attained	%	77.3	54.2	62.0	40.2	29.8	32.7	72.7	50.2	57.6
Geosciences	N	306	502	808	25	66	91	331	568	899
PhD Attained	%	60.8	37.5	46.3	28.0	12.1	16.5	58.3	34.5	43.3
Engineering	N	1290	2555	3845	10	49	59	1300	2604	3904
PhD Attained	%	57.7	40.2	46.0	20.0	16.3	16.9	57.4	39.7	45.6
EMP Total**	N	3336	6206	9542	191	645	836	3527	6851	10378
PhD Attained	%	64.2	43.1	50.5	34.0	19.1	22.5	62.5	40.8	48.2
Biosciences	N	1176	2399	3575	241	808	1049	1417	3207	4624
PhD Attained	%	73.6	50.1	57.9	35.3	25.6	27.8	67.1	44.0	51.1
Psychology	N	413	867	1280	136	433	569	549	1300	1849
PhD Attained	%	68.8	46.0	53.4	41.9	27.7	31.1	62.1	39.9	46.5
Social Sciences	N	1711	3121	4832	335	842	1177	2046	3963	6009
PhD Attained	%	54.2	31.0	39.3	23.0	13.8	16.4	49.1	27.4	34.8
Bio/Beh Total**	N	3300	6387	9687	712	2083	2795	4012	8470	12482
PhD Attained	%	63.0	40.3	48.0	30.8	21.3	23.7	57.3	35.6	42.5
Hum. & Prof.**	N	3196	6533	9729	1171	3252	4423	4367	9785	14152
PhD Attained	%	52.1	32.2	38.7	22.1	17.3	18.6	44.1	27.2	32.4
Education	N	740	1413	2153	274	727	1001	1014	2140	3154
PhD Attained	%	73.5	57.5	63.0	47.4	34.7	38.2	66.5	49.7	55.1
Non-Sci Total	N	3936	7946	11882	1445	3979	5424	5381	11925	17306
PhD Attained	%	56.1	36.7	43.1	26.9	20.5	22.2	48.3	31.3	36.6
KNOWN TOTAL	N	10572	20539	31111	2348	6707	9055	12920	27246	40166
PhD Attained	%	60.8	39.7	46.9	28.7	20.6	22.7	55.0	35.0	41.4

* N stands for number of awardees; PhD attained % is percentage of these N who have attained doctorates by 1974.

** EMP stands for Engineering, Mathematics, & Physical Sciences; Bio/Beh Total stands for biological and behavioral sciences; Hum. & Prof. stands for Humanities and Professions.

SOURCE: NRC, Commission on Human Resources

Table 3

NDEA Fellows of 1963-1973, by Cohort of First Award:
Percent in National Faculty Directory of 1975

Field of Application	*	MEN 1963 -66	MEN 1967 -73	MEN Total	WOMEN 1963 -66	WOMEN 1967 -73	WOMEN Total	BOTH SEXES 1963 -66	BOTH SEXES 1967 -73	BOTH SEXES Total
Mathematics	N	538	961	1499	52	238	290	590	1199	1789
	In NFD %	42.6	26.3	32.2	21.2	9.7	11.7	40.7	23.0	28.8
Physics	N	625	1064	1689	22	74	96	647	1138	1785
	In NFD %	17.6	9.5	12.5	9.1	9.5	9.4	17.3	9.5	12.3
Chemistry	N	577	1124	1701	82	218	300	659	1342	2001
	In NFD %	18.2	9.0	12.1	9.8	10.1	10.0	17.1	9.2	11.8
Geosciences	N	306	502	808	25	66	91	331	568	899
	In NFD %	26.8	11.8	17.5	20.0	6.1	9	26.3	11.1	16.7
Engineering	N	1290	2555	3845	10	49	59	1300	2604	3904
	In NFD %	16.1	9.8	11.9	20.0	4.1	6.8	16.2	9.7	11.9
EMP Total	N	3336	6206	9542	191	645	836	3527	6851	10378
	In NFD %	22.0	12.3	15.7	14.7	9.0	10.3	21.6	12.0	15.3
Biosciences	N	1176	2399	3575	241	808	1049	1417	3207	4624
	In NFD %	34.2	16.3	22.2	13.3	9.2	10.1	30.6	14.5	19.5
Psychology	N	413	867	1280	136	433	569	549	1300	1849
	In NFD %	35.8	22.7	27.0	16.9	8.8	10.7	31.1	18.1	22.0
Social Sciences	N	1711	3121	4832	335	842	1177	2046	3963	6009
	In NFD %	39.3	23.6	29.2	21.5	12.0	14.7	36.4	21.2	26.3
Bio/Beh Total	N	3300	6387	9687	712	2083	2795	4012	8470	12482
	In NFD %	37.0	20.8	26.3	17.8	10.2	12.7	33.6	18.2	23.1
Hum. & Prof.	N	3196	6533	9729	1171	3252	4423	4367	9785	14152
	In NFD %	43.2	24.3	30.5	15.9	13.0	13.7	35.9	20.5	25.3
Education	N	740	1413	2153	274	727	1001	1014	2140	3154
	In NFD %	39.6	26.1	30.7	22.6	16.6	18.3	35.0	22.9	26.8
Non-Sci Total	N	3936	7946	11882	1445	3979	5424	5381	11925	17306
	In NFD %	42.6	24.6	30.6	17.2	13.6	14.6	35.7	20.9	25.5
KNOWN TOTAL	N	10572	20539	31111	2348	6707	9055	12920	27246	40166
	In NFD %	34.3	19.7	24.7	17.2	12.1	13.4	31.2	17.8	22.1

* N means number of Fellows. In NFD % means percentage of these N in National Faculty Directory of 1975.

SOURCE: NRC, Commission on Human Resources .

Table 4

NDEA Fellows of 1963-1973, by Cohort of First Award:
Percent in CHR Dissertation Advisers File

Field of Application		MEN 1963-66	MEN 1967-73	MEN Total	WOMEN 1963-66	WOMEN 1967-73	WOMEN Total	BOTH SEXES 1963-66	BOTH SEXES 1967-73	BOTH SEXES Total
Mathematics	N*	538	961	1499	52	238	290	590	1199	1789
Advisers	%	4.1	.6	1.9				3.7	.5	1.6
Physics	N	625	1064	1689	22	74	96	647	1138	1785
Advisers	%	1.6		.6				1.5		.6
Chemistry	N	577	1124	1701	82	218	300	659	1342	2001
Advisers	%	1.6	.2	.6				1.4	.1	.5
Geosciences	N	306	502	808	25	66	91	331	568	899
Advisers	%	1.3		.5				1.2		.4
Engineering	N	1290	2555	3845	10	49	59	1300	2604	3904
Advisers	%	3.3	.4	1.4				3.3	.4	1.4
EMP Total	N	3336	6206	9542	191	645	836	3527	6851	10378
Advisers	%	2.6	.3	1.1				2.5	.3	1.0
Biosciences	N	1176	2399	3575	241	808	1049	1417	3207	4624
Advisers	%	3.1	.2	1.2				2.6	.2	.9
Psychology	N	413	867	1280	136	433	569	549	1300	1849
Advisers	%	6.5	2.2	3.6		.2	.2	4.9	1.5	2.5
Social Sciences	N	1711	3121	4832	335	842	1177	2046	3963	6009
Advisers	%	4.0	.6	1.8	.9		.3	3.5	.5	1.5
Bio/Beh Total	N	3300	6387	9687	712	2083	2795	4012	8470	12482
Advisers	%	4.0	.7	1.8	.4		.1	3.4	.5	1.4
Hum. & Prof.	N	3196	6533	9729	1171	3252	4423	4367	9785	14152
Advisers	%	2.2	.5	1.1	.4	.2	.2	1.7	.4	.8
Education	N	740	1413	2153	274	727	1001	1014	2140	3154
Advisers	%	9.2	2.4	4.7	2.2	.4	.9	7.3	1.7	3.5
Non-Sci Total	N	3936	7946	11882	1445	3979	5424	5381	11925	17306
Advisers	%	3.5	.8	1.7	.8	.2	.4	2.8	.6	1.3
KNOWN FLD TOTAL	N	10572	20539	31111	2348	6707	9055	12920	27246	40166
Advisers	%	3.4	.6	1.6	.6	.1	.3	2.9	.5	1.3

* N means number of Fellows; Advisers % means percentage of these N in Dissertation Advisers File.

SOURCE: NRC, Commission on Human Resources

Baccalaureate-to-Doctorate Time Lapse. With regard to those who have attained the doctorate degree, the time taken to reach that status is of considerable interest. The essential data on time lapse are provided in Table 5. Here, it should be noted, there is a shift in cohort designation, from cohorts of award to cohorts of graduation. This is essential in order to avoid artifacts, inasmuch as only the most accelerated of the recent award cohorts could have attained the doctorate, whereas for the earliest cohorts, almost all of those who will ever attain the degree had done so by 1974. Plotting the time lapse by award cohort would therefore show a spurious decrease in time lapse from the earliest to the most recent award cohorts. This difficulty is avoided by use of the cohorts of doctorate graduation. Data regarding women are rather scanty in the earliest graduation cohorts, and in some fields for all cohorts. In Table 5. means and standard deviations have not been calculated for cells with fewer than 20 cases. In all fields in which the numbers are large enough to provide reliable statistics, the baccalaureate-to-doctorate time lapse is greater for the women than for the men--a situation that is characteristic of the general PhD population.

A Reference Framework. Fortunately, data are available for PhD graduation cohorts, by sex and by field for the entire PhD population, for cohort groupings that are almost identical with those in Table 5. Comparative data, derived from the Doctorate Records File, are given in Table 6. In making a comparison between the data for the NDEA Fellows and the general PhD population, it should be kept in mind that there may be differences other than the NDEA support that distinguish this group; no ability measures, for example, are available to determine whether the Fellows are of a higher average academic capability. Their selection for these fellowships suggests that this may be the case, but there are no available data to test this hypothesis.

Plans at PhD: An Early Indicator of Probable Career Outcomes. One of the questions asked on the Survey of Earned Doctorates is what the new graduate's plans are for the year immediately following the award of the PhD. Data on the NDEA Fellows' responses to this question are shown in Table 7, by field of

Table 5

Baccalaureate-to-Doctorate Time Lapse in Years for NDEA Fellows of 1959-1973, by Field, Sex, and PhD Cohort

Field of Doctorate	MEN				WOMEN				BOTH SEXES			
	1961 -64	1965 -69	1970 -74	Total	1961 -64	1965 -69	1970 -74	Total	1961 -64	1965 -69	1970 -74	Total
Mathematics												
Number	52	335	580	967	2	6	38	46	54	341	618	1013
Mean	4.11	5.41	6.11	5.76			6.62	6.40	4.14	5.42	6.14	5.79
S.D.	1.28	2.24	2.41	2.36			2.92	2.84	1.27	2.25	2.44	2.39
Physics												
Number	30	291	682	1003		6	12	18	30	297	694	1021
Mean	5.63	5.82	6.68	6.40					5.63	5.86	6.70	6.42
S.D.	3.30	1.87	2.40	2.32					3.30	1.88	2.42	2.34
Chemistry												
Number	61	313	819	1193	1	15	82	98	62	328	901	1291
Mean	5.44	5.58	5.76	5.70			5.90	6.05	5.42	5.64	5.77	5.72
S.D.	2.55	2.55	2.16	2.29			2.33	2.99	2.53	2.74	2.18	2.35
Geosciences												
Number	6	115	318	439		4	11	15	6	119	329	454
Mean		6.93	7.58	7.38						7.00	7.58	7.40
S.D.		2.91	3.79	3.58						2.94	3.75	3.55
Engineering												
Number	63	616	1236	1915	1	2	7	10	64	618	1243	1925
Mean	4.98	5.89	6.76	6.42					4.98	5.89	6.77	6.43
S.D.	2.14	2.66	2.99	2.91					2.13	2.66	3.00	2.91
Life Sciences												
Number	91	663	1570	2324	3	61	228	292	94	724	1798	2616
Mean	5.21	6.23	6.66	6.48		6.79	7.45	7.32	5.31	6.28	6.76	6.58
S.D.	2.65	3.06	2.98	3.01		4.83	4.17	4.32	2.81	3.25	3.16	3.19
Psychology												
Number	30	244	591	865	6	46	173	225	36	290	764	1090
Mean	6.01	5.92	6.13	6.07		8.24	7.02	7.27	6.17	6.28	6.33	6.32
S.D.	3.81	3.26	2.59	2.84		5.66	4.36	4.64	3.68	3.82	3.10	3.33
Social Sciences												
Number	83	631	1562	2276	3	43	161	207	86	674	1723	2483
Mean	5.51	6.39	7.31	6.99		7.49	7.84	7.72	5.48	6.46	7.36	7.05
S.D.	3.28	2.86	3.22	3.17		6.11	4.25	4.67	3.23	3.17	3.33	3.32
Humanities												
Number	89	963	2569	3621	7	166	632	805	96	1129	3201	4426
Mean	5.15	6.83	7.78	7.46		8.30	8.43	8.38	5.23	7.04	7.91	7.63
S.D.	2.71	3.19	3.53	3.47		5.21	4.72	4.82	2.82	3.60	3.80	3.76
Professions												
Number	28	144	376	548	2	6	18	26	30	150	394	574
Mean	6.59	8.23	8.35	8.23				9.03	6.62	8.21	8.41	8.26
S.D.	4.35	5.02	4.68	4.76				7.90	4.27	5.05	4.93	4.94
Education												
Number	72	498	932	1502	6	88	274	368	78	586	1206	1870
Mean	8.10	9.27	10.12	9.74		11.46	11.34	11.33	8.19	9.60	10.40	10.06
S.D.	3.48	4.81	4.90	4.84		7.58	6.99	7.08	3.43	5.37	5.47	5.39
GRAND TOTAL												
Number	605	4813	11235	16653	31	443	1636	2110	636	5256	12871	18763
Mean	5.61	6.58	7.27	7.01	6.90	8.53	8.40	8.41	5.68	6.74	7.41	7.17
S.D.	3.07	3.36	3.49	3.46	3.49	5.96	5.16	5.32	3.10	3.69	3.76	3.74

SOURCE: NRC, Commission on Human Resources

Table 6

Reference Data for Entire Doctorate Records File: Mean and S.D. of BA-PhD Time Lapse in Years by Field, Sex and Cohort 1960-1974

	MEN			WOMEN			BOTH SEXES		
	1960 -64	1965 -69	1970 -74	1960 -64	1965 -69	1970 -74	1960 -64	1965 -69	1970 -74
Mathematics									
Mean	7.93	6.96	7.57	9.72	8.37	8.43	8.04	7.04	7.64
S.D.	4.51	3.78	3.66	7.15	4.78	4.96	4.73	3.86	3.79
Physics									
Mean	7.56	7.26	7.63	9.98	7.43	7.95	7.59	7.27	7.64
S.D.	3.39	3.27	3.36	5.23	2.95	3.32	3.44	3.26	3.36
Chemistry									
Mean	6.82	6.58	6.81	7.45	7.56	7.49	6.86	6.65	6.68
S.D.	3.49	3.50	3.35	4.24	4.63	4.07	3.54	3.60	3.43
Geosciences									
Mean	8.71	8.73	9.14	--	10.22	9.21	8.74	8.76	9.14
S.D.	4.55	4.25	4.80	--	6.38	5.34	4.58	4.31	4.82
Engineering									
Mean	8.20	8.23	8.57	8.54	8.00	8.81	8.20	8.23	8.57
S.D.	4.35	4.50	4.49	3.11	4.18	4.73	4.35	4.50	4.49
Life Sciences									
Mean	8.60	8.38	8.22	10.27	9.19	9.05	8.76	8.49	8.35
S.D.	4.34	4.47	4.26	5.89	5.78	5.75	4.54	4.67	4.53
Psychology									
Mean	8.55	7.94	7.77	11.59	10.62	9.76	9.13	8.54	8.32
S.D.	4.68	4.65	4.53	7.47	7.26	6.79	5.46	5.45	5.33
Social Sciences									
Mean	10.39	9.80	9.64	13.41	12.53	11.01	10.65	10.08	9.84
S.D.	5.72	5.70	5.39	8.26	8.09	7.03	6.03	6.05	5.67
Humanities									
Mean	11.13	10.81	10.68	14.35	13.26	12.31	11.64	11.28	11.07
S.D.	5.90	6.01	5.79	8.32	8.31	7.70	6.45	6.58	6.34
Education									
Mean	14.36	13.87	13.38	18.23	17.39	16.00	15.11	14.56	13.99
S.D.	7.05	6.55	6.58	8.62	8.88	8.82	7.54	7.20	7.26

SOURCE: NRC, Commission on Human Resources

doctorate, sex, and cohort of PhD graduation. Within each field, the proportion who plan to take further training, the percentage planning to enter academic employment, the percentage planning nonacademic employment, and the percentage who had not yet formulated plans, or who failed to respond, are given. Page 1 of Table 7 provides data for PhD's in mathematics, physics, chemistry, and the geosciences. Page 2 shows the data for engineers, life scientists, psychologists, and social scientists. Page 3 gives data for the nonscience fields and the total of all fields. Data for men are given in the left-hand columns, for women in the middle, and for both sexes combined at the right. Examining just the combined-sex totals, one notes that the percentage planning postdoctoral training varies enormously from field to field. In mathematics it is 7.6%, in physics 35.0%, in chemistry 42.0%, in the geosciences 19.3%, in engineering 7.3%, in the life sciences 36.3%, in psychology 13.9%, in the social sciences 3.6%, and in the nonscience fields even less. The variations in the percentages planning academic employment are also large, ranging from 17.7% in chemistry through about 25% in physics and engineering to 82.8% in the humanities and professions. Nonacademic employment is high in engineering (62.6%), geosciences (35.4%) and very low in the humanities and professions (8.0%). The percentage of uncertainty (or other plans) for all cohorts combined ranges from about 4% to about 7% but has been rising in all fields over the 15-year period shown from about 2% to 3% for a typical figure in the early 1960's to the neighborhood of 8% in recent years.

A Reference Frame for Comparison with All PhD's. Data from the Doctorate Records File regarding plans at PhD graduation provide a basis for considering the significance of the data of Table 7. However, an exactly comparable table is not available; Tables 8 and 9 taken together come close. In Table 8, data are provided on the proportion of all PhD's who plan postdoctoral training in the first year following graduation; the cohorts of graduation are the same as for Table 7. Employment data are not provided in the same detail, however. For percentages planning academic employment, and other types of employment, based on the fraction of the entire group who plan employment, see Table 9. Again, the graduation categories are compatible with those of Table 7 and Table 8.

Table 7

Postdoctoral Plans of NDEA Fellows, by Field, Sex, and Cohort of Graduation, 1960-1974

		Cohort of PhD																					
		MEN						WOMEN						BOTH SEXES COMBINED					
		1960-64	1965-68	1969-70	1971-72	1973-74	TOTAL MEN	1960-64	1965-68	1969-70	1971-72	1973-74	TOTAL WOMEN	1960-64	1965-68	1969-70	1971-72	1973-74	GRAND TOTAL
FIELD OF PHD - MATHEMATICS																			
POSTDOC TRAINING	N	2	18	19	25	10	74			1	3		4	2	18	20	28	10	78
	V*	3.8	7.6	8.2	8.3	6.7	7.6			10.0	14.3		8.7	3.6	7.5	8.2	8.7	6.3	7.6
ACADEMIC EMPL	N	38	157	165	214	98	672	2	2	9	15	8	36	40	159	174	229	106	708
	V	71.7	66.5	70.8	70.9	65.3	69.0	100.0	66.7	90.0	71.4	80.0	78.3	72.7	66.5	71.6	70.9	66.3	69.4
NONACAD EMPL	N	12	57	40	41	35	185		1		2	2	5	12	58	40	43	37	190
	V	22.6	24.2	17.2	13.6	23.3	19.0		33.3		9.5	20.0	10.9	21.8	24.3	16.5	13.3	23.1	18.6
OTHER/UNKNOWN PLANS	N	1	4	9	22	7	43				1		1	1	4	9	23	7	44
	V	1.9	1.7	3.9	7.3	4.7	4.4				4.8		2.2	1.8	1.7	3.7	7.1	4.4	4.3
TOTAL	N	53	236	233	302	150	974	2	3	10	21	10	46	55	239	243	323	160	1020
PHYSICS																			
POSTDOC TRAINING	N	8	43	76	152	74	353			2	1	3	6	8	43	78	153	77	359
	V	26.7	23.1	31.9	42.9	37.2	35.1			28.6	33.3	60.0	33.3	26.7	22.8	31.8	42.9	37.7	35.0
ACADEMIC EMPL	N	8	63	70	71	39	251		3	4			7	8	66	74	71	39	258
	V	26.7	33.9	29.4	20.1	19.6	24.9		100.0	57.1			38.9	26.7	34.9	30.2	19.9	19.1	25.2
NONACAD EMPL	N	13	75	74	103	69	334			1		2	3	13	75	75	103	71	337
	V	43.3	40.3	31.1	29.1	34.7	33.2			14.3		40.0	16.7	43.3	39.7	30.6	28.9	34.8	32.9
OTHER/UNKNOWN PLANS	N	1	5	18	28	17	69				2		2	1	5	18	30	17	71
	V	3.3	2.7	7.6	7.9	8.5	6.9				66.7		11.1	3.3	2.6	7.3	8.4	8.3	6.9
TOTAL	N	30	186	238	354	199	1007		3	7	3	5	18	30	189	245	357	204	1025
CHEMISTRY																			
POSTDOC TRAINING	N	19	59	114	219	96	507	1		10	19	9	39	20	59	124	238	105	546
	V	31.1	29.1	37.6	52.9	43.8	42.3	100.0		38.5	43.2	42.9	39.4	32.3	28.1	37.7	52.0	43.8	42.0
ACADEMIC EMPL	N	15	45	52	60	33	205		3	8	10	4	25	15	48	60	70	37	230
	V	24.6	22.2	17.2	14.5	15.1	17.1		42.9	30.8	22.7	19.0	25.3	24.2	22.9	18.2	15.3	15.4	17.7
NONACAD EMPL	N	26	94	128	118	74	440		4	3	11	5	23	26	98	131	124	79	463
	V	42.6	46.3	42.2	28.5	33.8	36.7		57.1	11.5	25.0	23.8	23.2	41.9	46.7	39.8	28.2	32.9	35.6
OTHER/UNKNOWN PLANS	N	1	5	9	17	16	48			5	4	3	12	1	5	14	21	19	60
	V	1.6	2.5	3.0	4.1	7.3	4.0			19.2	9.1	14.3	12.1	1.6	2.4	4.3	4.6	7.9	4.6
TOTAL	N	61	203	303	414	219	1200	1	7	26	44	21	99	62	210	329	458	240	1299
GEOSCIENCES																			
POSTDOC TRAINING	N	1	10	22	29	22	84			1	3		4	1	10	23	32	22	88
	V	16.7	12.5	21.0	20.6	20.4	19.1			33.3	60.0		26.7	16.7	12.3	21.3	21.9	19.3	19.3
ACADEMIC EMPL	N	1	37	35	66	37	176		1	2		5	8	1	38	37	66	42	184
	V	16.7	46.3	33.3	46.8	34.3	40.0		100.0	66.7		83.3	53.3	16.7	46.9	34.3	45.2	36.8	40.4
NONACAD EMPL	N	3	31	46	39	39	158				2	1	3	3	31	46	41	40	161
	V	50.0	38.8	43.8	27.7	36.1	35.9				40.0	16.7	20.0	50.0	38.3	42.6	28.1	35.1	35.4
OTHER/UNKNOWN PLANS	N	1	2	2	7	10	22							1	2	2	7	10	22
	V	16.7	2.5	1.9	5.0	9.3	5.0							16.7	2.5	1.9	4.8	8.8	4.8
TOTAL	N	6	80	105	141	108	440		1	3	5	6	15	6	81	108	146	114	455

* V means vertical percentage, based on the total number (N) within each field.

SOURCE: NRC, Commission on Human Resources

Table 7 (continued)

Postdoctoral Plans of NDEA Fellows, by Field, Sex, and Cohort of Graduation, 1960-1974

		MEN						WOMEN						BOTH SEXES COMBINED					
		1960-64	1965-68	1969-70	1971-72	1973-74	TOTAL MEN	1960-64	1965-68	1969-70	1971-72	1973-74	TOTAL WOMEN	1960-64	1965-68	1969-70	1971-72	1973-74	GRAND TOTAL
FIELD OF PHD - ENGINEERING																			
POSTDOC TRAINING	N	4	13	35	59	30	141			1			1	4	13	36	59	30	142
	V*	6.3	3.0	7.4	10.0	8.0	7.3			33.3			10.0	6.3	3.0	7.5	10.0	7.9	7.3
ACADEMIC EMPL	N	21	132	130	143	70	496	1		2	2		5	22	132	132	145	70	501
	V	33.3	30.6	27.4	24.3	18.7	25.7	100.0		66.7	100.0		50.0	34.4	30.6	27.6	24.6	18.5	25.8
NONACAD EMPL	N	37	268	299	363	244	1213					3	3	37	268	299	363	247	1216
	V	58.7	62.0	62.9	61.7	65.2	62.8					75.0	30.0	57.8	62.0	62.6	61.5	65.7	62.6
OTHER/UNKNOWN PLANS	N	1	19	11	23	29	83					1	1	1	19	11	23	30	84
	V	1.6	4.4	2.3	3.9	7.7	4.3					25.0	10.0	1.6	4.4	2.3	3.9	7.9	4.3
TOTAL	N	63	432	475	588	375	1933	1		3	2	4	10	64	432	478	590	379	1943
LIFE SCIENCES																			
POSTDOC TRAINING	N	22	119	194	298	186	819	1	11	25	30	49	136	23	130	219	328	235	955
	V	23.4	28.3	32.8	38.8	40.5	35.1	33.3	27.5	48.1	46.9	52.7	46.1	23.7	28.3	34.0	38.7	42.6	36.5
ACADEMIC EMPL	N	43	191	247	209	150	941	1	14	21	37	23	98	44	205	268	327	173	1039
	V	45.7	45.5	45.1	37.9	32.7	40.3	33.3	35.0	40.4	34.6	26.9	33.2	45.4	44.6	44.7	37.3	31.7	39.7
NONACAD EMPL	N	27	102	119	152	99	499		12	4	11	12	39	27	114	123	163	111	538
	V	28.7	24.3	20.1	19.8	21.6	21.4		30.0	7.7	10.3	12.9	13.2	27.8	24.8	19.1	18.6	20.1	20.5
OTHER/UNKNOWN PLANS	N	2	8	12	29	24	75	1	3	2	9	7	22	3	11	14	38	31	97
	V	2.1	1.9	2.0	3.8	5.2	3.2	33.3	7.5	3.8	8.4	7.5	7.5	3.1	2.4	2.2	4.3	5.6	3.7
TOTAL	N	94	420	592	769	459	2334	3	40	52	107	93	295	97	460	644	876	552	2629
PSYCHOLOGY																			
POSTDOC TRAINING	N	3	18	30	52	21	124		2	7	9	10	29	3	21	37	61	31	153
	V	10.0	11.6	13.4	18.0	12.1	14.2		13.6	12.5	12.0	14.9	12.8	8.3	11.9	13.2	16.8	12.9	13.9
ACADEMIC EMPL	N	17	93	142	162	82	496	3	11	34	40	30	120	20	104	178	202	112	616
	V	56.7	60.0	63.4	56.1	47.4	56.9	50.0	50.0	64.3	53.3	44.8	53.1	55.6	58.8	63.6	55.5	46.7	56.2
NONACAD EMPL	N	10	38	45	65	52	210	3	4	11	18	18	58	13	42	56	83	70	268
	V	33.3	24.5	20.1	22.5	30.1	24.1	50.0	36.4	19.6	24.0	26.9	25.7	36.1	26.0	20.0	22.8	29.2	24.4
OTHER/UNKNOWN PLANS	N		6	7	10	18	41			2	8	9	19		6	9	18	27	60
	V		3.9	3.1	3.5	10.4	4.7			3.6	10.7	13.4	8.4		3.4	3.2	4.9	11.3	5.5
TOTAL	N	30	155	224	289	173	871	6	22	56	75	67	226	36	177	280	364	240	1097
SOCIAL SCIENCES																			
POSTDOC TRAINING	N	5	17	18	23	18	81		1	1	3	5	10	5	18	19	26	23	91
	V	5.9	4.0	3.6	3.0	3.5	3.5		2.4	2.7	4.2	7.7	4.7	5.7	3.9	3.5	3.1	4.0	3.6
ACADEMIC EMPL	N	60	321	397	591	371	1740	3	27	31	58	49	168	63	348	428	649	420	1908
	V	70.6	75.4	78.3	78.0	72.3	76.0	100.0	79.4	83.8	80.6	75.4	79.6	71.6	75.7	78.7	78.2	72.9	76.3
NONACAD EMPL	N	18	73	76	108	95	370		6	4	9	8	27	18	79	80	117	103	397
	V	21.2	17.1	15.0	14.2	18.5	16.2		17.6	10.8	12.5	12.3	12.8	20.5	17.2	14.7	14.1	17.8	15.9
OTHER/UNKNOWN PLANS	N	2	13	14	34	29	98			1	2	3	6	2	13	17	38	32	104
	V	2.4	3.0	3.2	4.7	5.7	4.3			2.7	2.8	4.6	2.8	2.3	3.0	3.1	4.6	5.5	4.2
TOTAL	N	85	424	507	758	513	2289	3	34	37	72	65	211	88	460	544	830	578	2500

* V means vertical percentage, based on the total number (N) within each field.

SOURCE: NRC, Commission on Human Resources

Table 7 (continued)

Postdoctoral Plans of NDEA Fellows, by Field, Sex, and Cohort of Graduation, 1960-1974

		MEN						WOMEN						BOTH SEXES COMBINED				
		1960 -64	1965 -68	1969 -70	1971 -72	1973 -74	TOTAL MEN	1960 -64	1965 -68	1969 -70	1971 -72	1973 -74	TOTAL WOMEN	1960 -64	1965 -68	1969 -73	1971 -72	1973 -74	GRAND TOTAL
FIELD OF PHD - HUMANITIES & PROFESSIONS																			
POSTDOC TRAINING	N*	5	9	24	42	43	123	1		9	12	11	33	6	9	33	54	54	156
	V	4.3	1.3	2.5	3.1	4.1	2.9	11.1		5.0	4.4	4.0	4.0	4.8	1.1	2.9	3.3	4.1	3.1
ACADEMIC EMPL	N	98	604	861	1138	816	3517	7	81	145	219	201	653	105	685	1006	1357	1017	4170
	V	83.8	85.6	88.4	84.4	77.1	83.7	77.8	83.5	81.0	79.6	73.1	78.2	83.3	85.3	87.3	83.6	76.3	82.8
NONACAD EMPL	N	12	62	52	88	119	333		6	10	24	32	72	12	68	62	112	151	405
	V	10.3	8.8	5.3	6.5	11.2	7.9		6.2	5.6	8.7	11.6	8.6	9.5	8.5	5.4	6.9	11.3	8.0
OTHER/UNKNOWN PLANS	N	2	31	37	80	80	230	1	10	15	20	31	77	3	41	52	100	111	307
	V	1.7	4.4	3.8	5.9	7.6	5.5	11.1	10.3	8.4	7.3	11.3	9.2	2.4	5.1	4.5	6.2	8.3	6.1
TOTAL	N	117	706	974	1348	1058	4203	9	97	179	275	275	835	126	803	1153	1623	1333	5038
EDUCATION																			
POSTDOC TRAINING	N	1	6	13	9	4	33	1	1	5	5	6	18	2	7	18	14	10	51
	V	1.4	2.0	2.7	2.1	1.7	2.2	16.7	2.1	4.1	4.0	8.3	4.8	2.6	2.0	3.0	2.5	3.3	2.7
ACADEMIC EMPL	N	61	230	360	304	133	1088	4	34	89	87	34	248	65	264	449	391	167	1336
	V	84.7	77.7	75.8	69.6	58.1	72.1	66.7	70.8	73.6	69.0	47.2	66.5	83.3	76.7	75.3	69.4	55.5	71.0
NONACAD EMPL	N	9	52	88	111	75	335	1	11	23	24	20	79	10	63	111	135	95	414
	V	12.5	17.6	18.5	25.4	32.8	22.2	16.7	22.9	19.0	19.0	27.8	21.2	12.8	18.3	18.6	24.0	31.6	22.0
OTHER/UNKNOWN PLANS	N	1	8	14	13	17	53		2	4	10	12	28	1	10	18	23	29	81
	V	1.4	2.7	2.9	3.0	7.4	3.5		4.2	3.3	7.9	16.7	7.5	1.3	2.9	3.0	4.1	9.6	4.3
TOTAL	N	72	296	475	437	229	1509	6	48	121	126	72	373	78	344	596	563	301	1882
TOTAL																			
POSTDOC TRAINING	N	70	312	545	908	504	2339	4	16	62	105	93	280	74	328	607	1013	597	2619
	V	11.5	9.9	13.2	16.8	14.5	14.0	12.9	6.3	12.6	14.4	15.0	13.2	11.5	9.7	13.1	16.5	14.6	13.9
ACADEMIC EMPL	N	362	1873	2479	3039	1829	9582	21	176	347	468	356	1368	383	2049	2826	3507	2185	10950
	V	59.2	59.6	60.1	56.3	52.5	57.2	67.7	69.0	70.2	64.1	57.6	64.3	59.7	60.4	61.2	57.2	53.3	58.0
NONACAD EMPL	N	167	852	967	1188	903	4077	4	48	56	101	103	312	171	900	1023	1289	1006	4389
	V	27.3	27.1	23.4	22.0	25.9	24.3	12.9	18.8	11.3	13.8	16.7	14.7	26.6	26.5	22.1	21.0	24.5	23.2
OTHER/UNKNOWN PLANS	N	12	103	135	265	247	762	2	15	29	56	66	168	14	118	169	321	313	930
	V	2.0	3.3	3.3	4.9	7.1	4.5	6.5	5.9	5.9	7.7	10.7	7.9	2.2	3.5	3.5	5.2	7.6	4.9
TOTAL	N	611	3140	4126	5400	3483	16760	31	255	494	730	618	2128	642	3395	4620	6130	4101	18888

* V means vertical percentage, based on the total number (N) within each field.

SOURCE: NRC, Commission on Human Resources

Table 8

Postdoctoral Plans, by Field, Sex, and Cohort: PhD's of 1960-1974

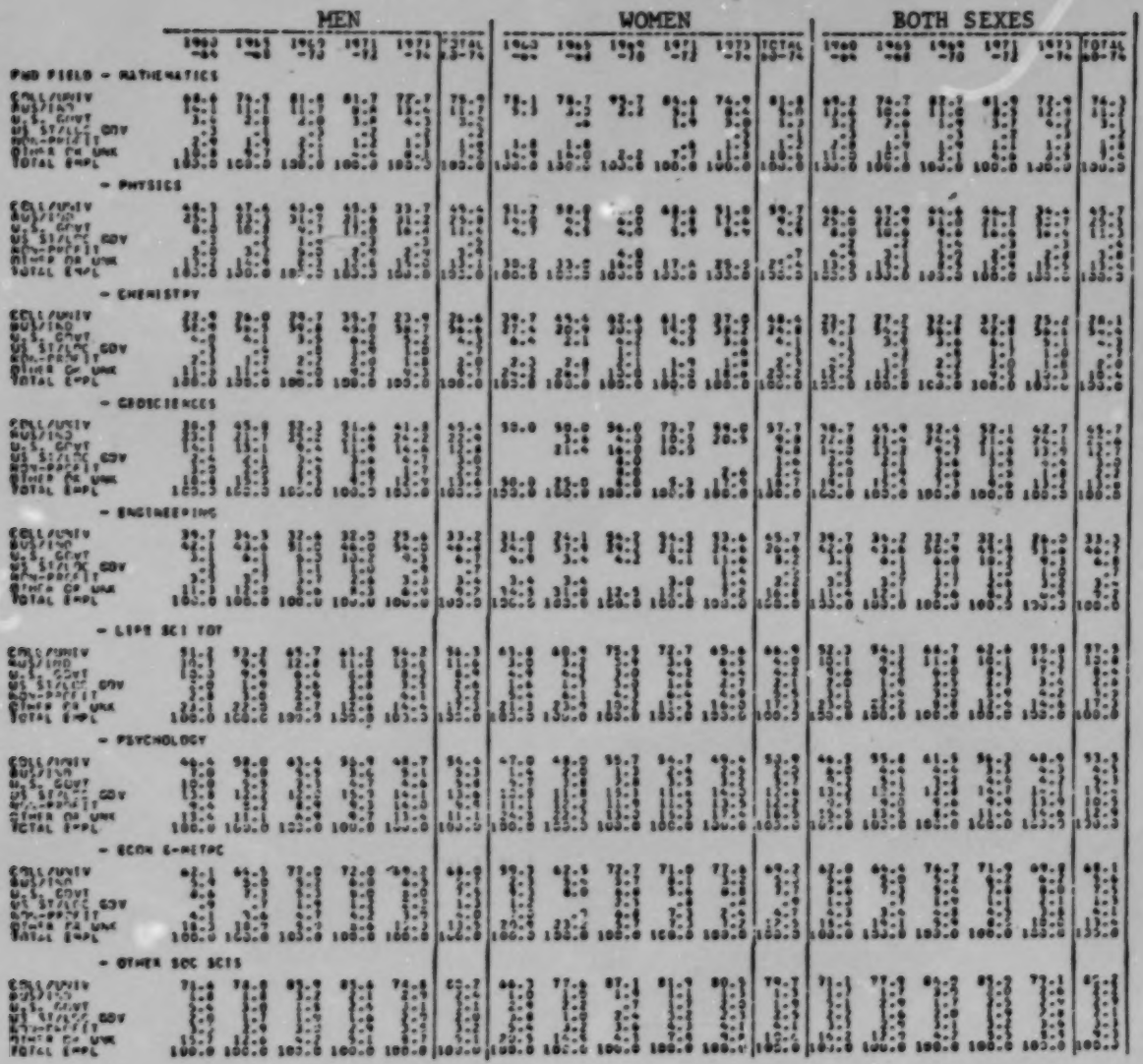
PhD Field / Postdoc Plans	Men 1960-64	Men 1965-68	Men 1969-70	Men 1971-72	Men 1973-74	Men TOTAL 60-74	Women 1960-64	Women 1965-68	Women 1969-70	Women 1971-72	Women 1973-74	Women TOTAL 60-74	BOTH SEXES 1960-64	BOTH SEXES 1965-68	BOTH SEXES 1969-70	BOTH SEXES 1971-72	BOTH SEXES 1973-74	BOTH SEXES TOTAL 60-74
PHD FIELD - MATHEMATICS																		
POSTDOC STUDY	8.5	9.2	8.3	9.7	8.9	8.1	3.4	5.1	4.4	12.5	7.4	7.0	8.3	6.2	8.1	9.4	8.8	8.0
EMPLOYMENT	85.5	87.4	85.5	82.1	81.6	84.7	87.7	85.8	87.4	81.1	85.9	84.9	85.7	87.4	85.6	82.2	81.8	84.7
MILITARY SVC	2.0	1.8	2.0	2.5	1.4	1.9							1.8	1.7	1.8	2.3	1.2	1.8
OTHER PLANS	.1	.2	.2	.2	.2	.2							.1	.2	.2	.2	.2	.2
UNKNOWN	3.7	4.1	4.0	5.5	7.9	5.1	3.1	3.0	2.5	3.6	2.3	2.9	3.9	4.3	4.1	5.7	7.6	5.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PHYSICS																		
POSTDOC STUDY	16.6	23.7	37.1	42.8	44.4	31.3	8.6	18.8	41.7	42.9	44.8	33.1	16.5	23.6	37.2	42.8	44.4	31.4
EMPLOYMENT	76.0	68.3	53.8	45.9	43.3	59.3	74.7	73.9	52.1	45.5	40.8	55.5	75.6	68.5	53.7	45.8	43.2	59.2
MILITARY SVC	2.9	2.8	2.4	2.1	3.0	2.6							2.8	2.7	2.3	2.1	2.9	2.6
OTHER PLANS	.2	.1	.2	.3	.3	.2							.2	.1	.2	.3	.3	.2
UNKNOWN	4.4	5.1	6.4	9.0	9.0	6.5	3.4	.8		2.7		1.2	4.5	5.1	6.4	9.0	9.2	6.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	13.8	8.4	6.2	8.2	14.4	10.3	100.0	100.0	100.0	100.0	100.0	100.0
CHEMISTRY							100.0	100.0	100.0	100.0	100.0	100.0						
POSTDOC STUDY	25.0	29.7	34.7	49.6	46.4	35.4	28.1	33.8	37.9	45.4	45.0	38.1	25.2	30.0	34.8	49.3	44.3	35.6
EMPLOYMENT	70.3	64.1	57.5	42.2	44.7	58.2	63.7	65.5	51.8	41.8	43.7	52.5	69.9	63.9	57.0	42.2	44.6	57.7
MILITARY SVC	1.9	3.2	2.4	2.6	1.9	2.5				.5		.1	1.8	2.9	2.3	2.6	1.7	2.3
OTHER PLANS	.1	.1	.1	.2	.1	.1	3.2	2.4	2.7	1.4	1.3	2.2	.2	.2	.2	.2	.2	.2
UNKNOWN	2.8	3.0	3.3	5.2	6.9	3.9	4.1	3.6	7.6	10.9	10.1	7.1	3.9	3.0	5.6	5.7	7.5	4.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
GEOSCIENCES																		
POSTDOC STUDY	8.2	11.7	20.6	21.5	21.8	15.9	11.1	8.8	28.9	34.2	23.2	22.8	8.2	11.4	20.9	21.9	21.8	16.0
EMPLOYMENT	85.1	81.7	73.5	71.2	68.7	77.0	86.7	82.4	65.8	50.0	69.6	66.8	85.1	81.7	73.2	70.5	68.8	76.8
MILITARY SVC	1.8	2.5	2.4	2.8	1.8	2.3							1.8	2.4	2.3	2.7	1.7	2.2
OTHER PLANS	.1		.1	.1	.2	.1	11.1	2.9	2.6	2.6		2.7	.2	.1	.2	.2	.2	.2
UNKNOWN	4.6	4.1	3.4	4.5	7.5	4.8	11.1	5.9	2.6	13.2	7.1	7.6	4.7	4.3	3.4	4.8	7.5	4.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ENGINEERING																		
POSTDOC STUDY	4.9	5.2	8.3	12.9	13.1	8.6	11.8	8.3	7.1	4.8	11.8	9.3	4.9	5.3	8.3	12.9	13.1	8.6
EMPLOYMENT	88.5	87.0	84.6	77.6	75.1	83.0	85.3	80.6	85.7	78.8	81.2	81.8	88.4	86.9	84.6	77.6	75.2	83.0
MILITARY SVC	4.0	4.3	4.1	4.3	3.8	4.1							4.0	4.3	4.0	4.1	3.7	4.1
OTHER PLANS	.1	.1	.2	.3	.1	.2							.1	.1	.2	.3	.1	.2
UNKNOWN	2.6	3.6	2.8	4.9	7.9	4.2	2.9	5.3	3.4	2.4	1.2	2.7	2.6	3.4	2.8	4.9	7.8	4.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LIFE SCI TOT																		
POSTDOC STUDY	21.7	27.6	35.8	37.3	36.4	31.3	29.0	34.6	46.3	46.4	49.1	42.4	22.4	28.7	37.2	39.7	38.8	32.8
EMPLOYMENT	73.9	67.0	57.0	54.9	54.4	62.2	64.1	57.3	46.0	43.7	39.6	49.1	72.9	65.7	56.3	53.3	51.8	60.4
MILITARY SVC	2.0	2.3	2.3	1.7	1.5	2.0	.2			.1	.2	.1	1.8	2.0	2.0	1.5	1.3	1.7
OTHER PLANS	.2	.3	.2	.2	.2	.2	3.0	2.4	2.0	1.6	1.0	1.9	.5	.6	.4	.4	.3	.4
UNKNOWN	2.1	2.6	3.8	5.8	7.4	4.3	3.8	5.8	5.7	8.2	9.9	6.6	2.4	3.0	4.1	5.1	7.8	4.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PSYCHOLOGY																		
POSTDOC STUDY	10.4	13.2	13.4	12.4	12.2	12.3	10.0	10.9	17.1	13.4	14.2	12.6	10.3	12.7	13.3	12.7	12.8	12.4
EMPLOYMENT	85.2	82.3	82.3	78.1	77.0	80.0	82.7	82.0	81.3	78.2	76.5	79.7	83.0	82.6	80.6	78.1	76.8	79.9
MILITARY SVC	2.6	3.1	2.7	3.2	3.1	2.9	.1			.2	.2	.1	2.1	2.2	2.1	2.4	2.2	2.2
OTHER PLANS	.3	.1	.2	.3	.4	.2	4.0	2.0	1.3	.8	.5	1.8	2.0	.9	.5	.5	.3	.7
UNKNOWN	2.5	2.3	2.4	5.9	7.3	4.5	3.2	5.1	4.3	6.5	8.3	5.9	2.7	3.7	3.4	6.0	7.6	4.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ECON & METRC																		
POSTDOC STUDY	1.6	2.3	2.6	4.4	4.2	2.9	2.1	.8	4.0	2.3	3.3	2.5	1.6	2.2	2.7	4.2	4.1	2.8
EMPLOYMENT	93.0	90.7	89.5	89.7	88.4	90.3	88.7	90.3	88.0	94.7	87.4	89.9	92.8	90.7	89.4	89.2	88.4	90.3
MILITARY SVC	1.2	1.5	2.4	1.0	.5	1.3							1.2	1.4	2.3	1.0	.4	1.2
OTHER PLANS		.1		.1	.2	.1							.2	.2	.3	.1	.2	.2
UNKNOWN	4.2	5.4	5.5	5.8	6.7	5.4	9.2	8.8	7.0	3.0	9.3	7.4	4.3	5.4	5.6	5.5	6.8	5.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OTHER SOC SCIS																		
POSTDOC STUDY	3.8	3.2	4.3	4.3	4.3	4.1	3.8	4.2	7.8	5.1	7.3	5.9	3.8	3.3	4.9	4.4	5.0	4.4
EMPLOYMENT	89.0	89.6	88.5	87.2	84.8	87.7	85.2	86.1	85.1	84.5	83.2	84.5	88.4	89.2	88.0	86.7	84.5	87.2
MILITARY SVC	1.4	1.8	2.0	1.6	.9	1.5	.3			.1		.1	1.5	1.6	1.8	1.3	.7	1.3
OTHER PLANS	.1	.3	.1	.2	.2	.2	3.5	3.1	2.0	1.7	1.0	2.2	.7	.6	.4	.4	.4	.5
UNKNOWN	5.8	5.3	4.9	6.5	9.6	6.6	7.2	6.6	5.1	8.6	8.4	7.4	5.4	5.4	4.9	7.1	9.5	6.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: NRC, Commission on Human Resources

Table 9

Percentage Distribution of Planned Employer Categories, for New PhD's by Field, Sex, and Cohort of Graduation

(Data from Doctorate Records File)



SOURCE: NRC, Commission on Human Resources, A CENTURY OF DOCTORATES

From Doctorate to Employment. The old, well established institutions produce more than half of all new PhD's, although the proportion of all PhD's produced is a steadily decreasing fraction, as newer institutions begin producing doctorates. These older institutions also tend to be the more prestigious, as reflected in the Roose-Andersen ratings of their departments.* They produce more PhD's than they can eventually employ; hence the use of the R-A ratings provides a means of quantifying the movement from the high prestige departments to nonrated departments, or even out of the academic environment entirely, for postgraduation employment. In Table 10, the data showing the extent of this movement are given by cohort of graduation. Over 90% of the NDEA Fellows took their doctorates in departments rated in the Roose-Andersen system. Yet when these people are followed up through the National Faculty Directory, only about 15% were identified as being in R-A rated departments. Almost 28% were in unrated departments, and over half were either outside of the academic environment entirely, or could not be identified in this tabulation. Time trends in the data are minor except for the rather massive trend out of academic employment: 54.4% of the earliest graduation cohort were found in the National Faculty Directory, but only 36% of the most recent graduation cohort. This probably reflects the general trend toward restriction of opportunities for employment in colleges and universities that has been well documented elsewhere during the last decade.

Table 10

Roose-Andersen Ratings of Departments of PhD & Departments of Employment (from National Faculty Directory), by Cohort of Award, 1959-1973 NDEA Fellows, Both Sexes, All Fields Combined

		PhD Departments				NFD Dept. of Empl.			
Award Cohort ⇨		1959-62	63-66	67-73	Total	1959-62	63-66	67-73	Total
Total Rated Departments	N	3,088	6,514	8,547	18,149	669	1,276	1,122	3,067
	%	92.4	91.7	89.5	90.8	20.0	18.0	11.7	15.3
Unrated Departments	N	255	588	1,006	1,849	1,151	2,074	2,318	5,543
	%	7.6	8.3	10.5	9.2	34.4	29.2	24.3	27.7
Total Academic	N	3,343	7,102	9,553	19,998	1,820	3,350	3,440	8,610
	%	100.0	100.0	100.0	100.0	54.4	47.2	36.0	43.1
Nonacademic & Unknown	N					1,523	3,752	6,113	11,388
	%					45.6	52.8	64.0	56.9
Grand Total	N					3,343	7,102	9,553	19,998
	%					100.0	100.0	100.0	100.0

SOURCE: NRC, Commission on Human Resources

* See footnote on page 3.

Award of Research Grants. The tape listing the NIH research grants awards for the period 1962-1971 and the NSF grants for 1967-1972 has been described earlier. In Table 11, the data derived from the collation of this data source with the NDEA tape are shown, by field of application and by sex for the awardees of the period 1963-1966 and 1967-1973. For the earlier awardees the field of application could not be ascertained. The fields of NDEA award are grouped into three general categories, as well as shown individually: the EMP fields, the biobehavioral fields, and the nonscience fields. The award of research grants to the latter group is infrequent, (only one-tenth of one percent) but occurs because of field switching subsequent to the first NDEA award. In the EMP fields, 1.8% of the NDEA fellows won research grants during the period covered; in the biobehavioral fields 1.2% did so.

There is a marked cohort difference; the older cohort, the members of which have had more time to become established and apply for research grants, have a much higher percentage in the grant category. This time trend can be extended further, for the total of all fields, by including the early cohort, 1953-1962, for which field data are not available. For the three cohorts the percentages are as follows: men, 4.0%, 2.2%, and 0.5%; women, 0.4%, 0.5%, and 0.1%; for the combined total of both sexes, 3.5%, 1.9%, and 0.4%, for all NDEA Fellows combined, including the nonscience fields.

Employment of Scientists. For those NDEA Fellows who received PhD's in the science fields, the Comprehensive Roster of Doctoral Scientists and Engineers (CR) forms another means of follow-up into the employment situation. (The Roster has now been extended to cover the humanities fields, but data were not available in time for the present tabulations.) Two surveys have been completed of carefully selected samples of persons in the CR, in 1973 and 1975. The number of NDEA Fellows included in the sample in these two years, by sex and by cohort of award, are shown in Table 12. The number and percentage of these who responded to the questionnaire are also given; the percentages are at least as good, and perhaps a little better than the response rates for the whole PhD population.

Table 11

NDEA Fellows of 1963-1973, by Cohort of First Award:
Percent Awarded Research Grants by NIH or NSF*

Field of Application	**	MEN 1963-66	MEN 1967-73	MEN Total	WOMEN 1963-66	WOMEN 1967-73	WOMEN Total	BOTH SEXES 1963-66	BOTH SEXES 1967-73	BOTH SEXES Total
Mathematics	N	538	961	1499	52	238	290	590	1199	1789
Awarded ResGt	%	4.1	1.5	2.4				3.7	1.2	2.0
Physics	N	625	1064	1689	22	74	96	647	1138	1785
Awarded ResGt	%	1.6	.4	.8	4.5	1.4	2.1	1.7	.4	.9
Chemistry	N	577	1124	1701	82	218	300	659	1342	2001
Awarded ResGt	%	2.6	.7	1.4		.5	.3	2.3	.7	1.2
Geosciences	N	306	502	808	25	66	91	331	568	899
Awarded ResGt	%	5.2	1.8	3.1	4.0	1.5	2.2	5.1	1.8	3.0
Engineering	N	1290	2555	3845	10	49	59	1300	2604	3904
Awarded ResGt	%	3.7	1.3	2.1				3.7	1.3	2.1
EMP Total	N	3336	6206	9542	191	645	836	3527	6851	10378
Awarded ResGt	%	3.3	1.1	1.9	1.0	.5	.6	3.2	1.0	1.8
Biosciences	N	1176	2399	3575	241	808	1049	1417	3207	4624
Awarded ResGt	%	5.3	.8	2.2	2.1	.2	.7	4.7	.6	1.9
Psychology	N	413	867	1280	136	433	569	549	1300	1849
Awarded ResGt	%	3.4	.2	1.3	.7	.5	.5	2.7	.3	1.0
Social Scis	N	1711	3121	4832	335	842	1177	2046	3963	6009
Awarded ResGt	%	1.9	.4	1.0	.3	.2	.3	1.7	.4	.8
Bio/Beh Total	N	3300	6387	9687	712	2083	2795	4012	8470	12482
Awarded ResGt	%	3.3	.5	1.5	1.0	.3	.5	2.9	.5	1.2
Hum. & Prof.	N	3196	6533	9729	1171	3252	4423	4367	9785	14152
Awarded ResGt	%	.3		.1	.2		.1	.3		.1
Education	N	740	1413	2153	274	727	1001	1014	2140	3154
Awarded ResGt	%	.3	.2	.2				.2	.1	.2
Non-Sci Total	N	3936	7946	11882	1445	3979	5424	5381	11925	17306
Awarded ResGt	%	.3	.1	.2	.1		.1	.3	.1	.1
KNOWN FLD TOTAL	N	10572	20539	31111	2348	6707	9055	12920	27246	40166
Awarded ResGt	%	2.2	.5	1.1	.5	.1	.2	1.9	.4	.9

* The available records for NIH covered the period 1962-1971, for NSF 1967-1972.

** N means number of awardees; Awarded ResGt % means percentage of these N who were awarded research grants by NIH or NSF.

SOURCE: NRC, Commission on Human Resources

Table 12

Response Rates of NDEA Fellows in Comprehensive Roster Surveys of 1973 and 1975
Total of All Fields Combined, by Cohorts of Award

12A. 1973 Survey	Cohort 1959-62	Cohort 1963-66	Cohort 1967-73	Total, All Cohorts
		MEN		
Number in C.R. 1973 Sample	410	624	419	1453
Respondents in 1973	319	496	345	1160
Response Percentage	77.8	79.5	82.3	79.8
		WOMEN		
Number in 1973 Sample	59	127	120	306
Respondents in 1973	44	105	105	254
Response Percentage	74.6	82.7	87.5	83.0
		SEXES COMBINED		
Number in 1973 Sample	469	751	539	1759
Respondents in 1973	363	601	450	1414
Response Percentage	77.4	80.0	83.5	80.4
12B. 1975 Survey				
		MEN		
Number in C.R. 1975 Sample	412	698	736	1846
Respondents in 1975	305	531	549	1385
Response Percentage	74.0	76.1	74.6	75.0
		WOMEN		
Number in 1975 Sample	59	143	229	431
Respondents in 1975	45	103	179	327
Response Percentage	76.3	72.0	78.2	75.9
		SEXES COMBINED		
Number in 1975 Sample	471	841	965	2277
Respondents in 1975	350	634	728	1712
Response Percentage	74.3	75.4	75.4	75.2

SOURCE: NRC, Commission on Human Resources

Employment Status. Table 13 shows the employment status of the NDEA Fellows in the 1973 CR Survey; Table 14 shows the corresponding data for 1975. For purposes of comparison, two tables, for 1973 and 1975 respectively, have been extracted from the Profile* reports for these two years, and are presented in Table 15. All three tables (13, 14, and 15) follow the same format, except that for the NDEA Fellows none were found to have retired; the fields in the NDEA tables are fields of fellowship award; in the norm tables taken from the Profile reports, the fields are those of doctorate. In examining Tables 13 and 14, it is worthy of note that the employment status statistics for the "field unknown" category are more favorable than for the group as a whole. This is undoubtedly because these were the early award cohorts (1959-1962), who have had more time to become established in jobs than have the more recent students. In all of these tables, two numbers are shown: N and WN, standing for actual Number and Weighted Number. The weights were assigned to allow an inflation of the survey sample to represent the original population from which the sample was drawn; the percentages are calculated on this weighted number (WN). For estimates of the reliability of the data, however, the size of the actual number of respondents (N) is the crucial figure. As will be noted in the rows for part-time employment and "not employed" (whether seeking or not) these N's are frequently very small. Only 21 persons, representing 126 cases in the base population, or 1.3%, were in the unemployed category. Only 40 cases (WN=175), or 1.8%, were in part-time employment in 1973. In 1975, the corresponding statistics were 1.3% unemployed and seeking, and 1.7% part-time employed. Although these figures may be reasonably reliable, those for the individual fields, being based on smaller numbers, are less reliable. There is an additional statistic in each of these tables, a percentage labelled "H", for horizontal percentage. This H% shows, within each employment status category, the proportion that each field represents as a percentage of all fields, given in the grand total in the right-hand column. These H% percentages thus describe the "field mix" within each category of employment status. It will be noted that the fields include some summaries, or field groups, including EMP (Engineering, Mathematics, and Physical Sciences), Bio/Beh Total (biological and behavioral sciences), and the known total (which includes only the awardees of the period 1963-1973).

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* See Doctoral Scientists and Engineers in the United States: 1973 (or 1975) Profile, National Academy of Sciences, Washington, D.C., 1974 (and 1976).

Table 13

Employment Status of NDEA Fellows in 1973 Comprehensive Roster Survey, by Field of Fellowship Award

Employment Status		Field of Fellowship															
		Math	Phys	Chem	Earth	Engr	EMP TOTAL	Biosc	Psych	SocSc	BIO/BEH TOTAL	Hum & Prof	Educ	NONSC TOTAL	KNOWN TOTAL	UNK	GRAND TOTAL
Employed Full-Time	N*	68	55	82	34	142	381	213	54	130	397	37	45	82	860	333	1193
	WN	522	358	506	242	1277	2905	1306	409	1211	2926	281	225	506	6337	2059	8396
	H	8.2	5.6	8.0	3.8	20.2	45.8	20.6	6.5	19.1	46.2	4.4	3.6	8.0	75.5	24.5	
	V	93.5	64.4	73.9	85.5	92.9	84.1	80.9	86.3	94.5	86.8	87.0	88.2	87.5	85.6	92.1	87.1
Employed Part-Time	N	4	3	4	1	1	13	8	4		12	2	3	5	30	10	40
	WN	4	20	9	1	11	45	30	17		47	5	13	18	110	65	175
	H	3.6	18.2	8.2	.9	10.9	40.9	27.3	15.5		42.7	4.5	11.8	16.4	62.9	37.1	
	V	.7	3.6	1.3	.4	.8	1.3	1.9	3.6		1.4	1.5	5.1	3.1	1.5	2.9	1.8
In Postdoctoral Training	N	2	21	24	4	4	55	34	3	2	39	2	2	4	98	5	103
	WN	10	156	134	26	37	363	168	13	20	201	16	14	30	594	31	625
	H	1.7	26.3	22.6	4.4	6.2	61.1	28.3	2.2	3.4	33.8	2.7	2.4	5.1	95.0	5.0	
	V	1.8	28.1	19.6	9.2	2.7	10.5	10.4	2.7	1.6	6.0	5.0	5.5	5.2	8.0	1.4	6.5
Not Employed, but Seeking	N	2	[illegible]	4	1	3	11	3	1	1	5	1		1	17	4	21
	WN	11	11	13	3	25	63	19	6	12	37	7		7	107	19	126
	H	10.3	10.3	12.1	2.8	23.4	58.9	17.8	5.6	11.2	34.6	6.5		6.5	84.9	15.1	
	V	2.0	2.0	1.9	1.1	1.8	1.8	1.2	1.3	.9	1.1	2.2		1.2	1.4	.8	1.3
Not Employed, Not Seeking	N	1		4			5	2		2	4				9	2	11
	WN	7		10			17	5		6	11				28	5	33
	H	25.0		35.7			60.7	17.9		21.4	39.3				84.8	15.2	
	V	1.3		1.5			.5	.3		.5	.3				.4	.2	.3
Other, & No Report	N	3	3	2	1	2	11	15	3	3	21	2	2	4	36	9	45
	WN	4	11	13	11	24	63	87	29	33	149	14	3	17	229	57	286
	H	1.7	4.8	5.7	4.8	10.5	27.5	38.0	12.7	14.4	65.1	6.1	1.3	7.4	80.1	19.9	
	V	.7	2.0	1.9	3.9	1.7	1.8	5.4	6.1	2.6	4.4	4.3	1.2	2.9	3.1	2.5	3.0
TOTAL	N	80	83	120	41	152	476	275	65	138	478	44	52	96	1050	363	1413
	WN	558	556	685	283	1374	3456	1615	474	1282	3371	323	255	578	7405	2236	9641
	H	7.5	7.5	9.3	3.8	18.6	46.7	21.8	6.4	17.3	45.5	4.4	3.4	7.8	76.8	23.2	
	V	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* N means actual number of respondents; WN means weighted number (see text for explanation); H means horizontal percentage; V means vertical percentage.

SOURCE: NRC, Commission on Human Resources

Table 14

Employment Status of NDEA Fellows in 1975 Comprehensive Roster Survey, by Field of Fellowship Award

Employment Status	*	Field of Fellowship: Math	Phys	Chem	Earth	Engr	EMP TOTAL	Biosc	Psych	SocSc	BIO/BEH TOTAL	Hum & Prof	Educ	NONSC TOTAL	KNOWN TOTAL	UNK	GRAND TOTAL
Employed Full-Time	N	98	87	120	42	180	527	295	85	176	556	49	48	97	1180	320	1500
	WN	769	767	884	324	1857	4601	2235	679	1795	4709	397	220	617	9927	2399	12326
	H	7.7	7.7	8.9	3.3	18.7	46.3	22.5	6.8	18.1	47.4	4.0	2.2	6.2	80.5	19.5	
	V	94.6	86.9	83.6	91.8	95.0	90.9	83.9	89.9	94.1	88.4	95.2	87.3	92.2	89.8	93.7	90.5
Employed Part-Time	N	6		7	3	2	18	10	3	4	17	2	2	4	39	8	47
	WN	23		28	19	16	86	60	14	31	105	11	3	14	205	25	230
	H	11.2		13.7	9.3	7.8	42.0	29.3	6.8	15.1	51.2	5.4	1.5	6.8	89.1	10.9	
	V	2.8		2.6	5.4	.8	1.7	2.3	1.9	1.6	2.0	2.6	1.2	2.1	1.9	1.0	1.7
In Postdoctoral Training	N	1	11	20		4	36	45	6	6	57	2	2	4	97	7	104
	WN	10	70	113		57	250	258	47	30	335	9	22	31	616	53	669
	H	1.6	11.4	18.3		9.3	40.6	41.9	7.6	4.9	54.4	1.5	3.6	5.0	92.1	7.9	
	V	1.2	7.9	10.7		2.9	4.9	9.7	6.2	1.6	6.3	2.2	8.7	4.6	5.6	2.1	4.9
Not Employed, but Seeking	N		3		1	2	6	11	1	2	14		1	1	21	4	25
	WN		20		9	24	53	72	4	25	101		7	7	161	18	179
	H		12.4		5.6	14.9	32.9	44.7	2.5	15.5	62.7		4.3	4.3	89.9	10.1	
	V		2.3		2.5	1.2	1.0	2.7	.5	1.3	1.9		2.8	1.0	1.5	.7	1.3
Not Employed, Not Seeking	N	1	3	6			10	9		2	11				21	6	27
	WN	11	20	33			64	40		27	67				131	26	157
	H	8.4	15.3	25.2			48.9	30.5		20.6	51.1				83.4	16.6	
	V	1.4	2.3	3.1			1.3	1.5		1.4	1.3				1.2	1.0	1.2
Other, & No Report	N		1		1		2		2		2				4	5	9
	WN		6		1		7		11		11				18	40	58
	H		33.3		5.6		38.9		61.1		61.1				31.0	69.0	
	V		.7		.3		.1		1.5		.2				.2	1.6	.4
TOTAL	N	106	105	153	47	188	599	370	97	190	657	53	53	106	1362	350	1712
	WN	813	883	1058	353	1954	5061	2665	755	1908	5328	417	252	669	11058	2561	13619
	H	7.4	8.0	9.6	3.2	17.7	45.8	24.1	6.8	17.3	48.2	3.8	2.3	6.0	81.2	18.8	
	V	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* N means actual number of respondents; WN means weighted number(see text for explanation); H means horizontal percentage; V means vertical percentage.

SOURCE: NRC, Commission on Human Resources

Table 15

Employment Status of U.S. Doctoral Scientists and Engineers in 1973 and 1975

1930-72 UNITED STATES DOCTORAL SCIENTISTS AND ENGINEERS

15 A EMPLOYMENT STATUS BY FIELD OF DOCTORATE -- 1973

YEAR OF DOCTORATE AND 1973 EMPLOYMENT STATUS		FIELD OF DOCTORATE									
1930-72 DOCTORATES	ALL FIELDS	MATH	PHYS	CHEM	EARTH	ENGIN	BIOSC	PSYCH	SOCSC	NONSC	UNK
TOTAL POPULATION N	244921	13571	22340	39270	7595	35067	61111	24483	32353	8935	195
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
EMPLOYED FULL-TIME %											
SCIENCE	82.7	89.2	83.9	80.1	88.1	90.2	81.6	79.5	76.6	84.3	75.9
NON-SCIENCE	4.6	2.2	3.5	5.6	2.3	3.7	3.0	4.9	10.3	.0	4.8
EMPLOYED PART-TIME %											
SCIENCE	2.4	1.6	2.1	2.1	2.1	1.3	2.7	5.8	2.8	3.7	5.1
NON-SCIENCE	.3	.1	.5	.5	.2	.1	.3	.3	.5	.0	1.0
POSTDOCTORAL %	2.4	.7	4.1	3.6	1.5	.8	4.2	1.1	.8	.5	1.0
NOT EMPLOYED %											
SEEKING	1.1	1.4	1.4	1.6	.7	.8	1.0	1.1	.8	.8	.0
NOT SEEKING	.6	.6	.5	.8	.1	.3	.9	.6	.5	.4	.6
RETIRED %	2.6	2.0	2.1	3.4	2.0	1.0	3.0	2.1	3.1	4.4	3.6
OTHER/NO REPORT %	3.2	2.4	2.0	2.4	2.7	1.9	3.4	4.7	4.5	5.8	8.7

15 B Employment Status of Doctoral Scientists and Engineers, 1975

A. Individuals Receiving Doctorates During 1930-1974

1975 Employment Status	All Fields	Field of Doctorate									
		Math	Phys	Chem	Earth	Engr	Biosc	Psych	SocSc	Nonsc	No Report
Total Population N	279,351	15,989	25,085	43,248	8,813	41,228	70,577	29,435	39,273	5,519	184
Employed Full-Time											
Science	83.7%	89.4%	83.2%	80.8%	87.8%	91.3%	81.8%	83.5%	79.3%	85.0%	97.3%
Nonscience	4.7	3.5	4.4	5.8	3.0	3.6	2.4	4.3	10.5	.0	.0
Employed Part-Time											
Science	2.4	1.9	1.6	1.8	3.3	1.2	2.5	5.6	2.3	3.8	.0
Nonscience	.3	.2	.4	.5	.2	.1	.2	.4	.6	.0	.0
Postdoctoral	3.0	.7	4.7	4.1	1.4	.9	5.6	1.5	.9	.2	.0
Not Employed											
Seeking Employment	.9	.6	1.5	1.0	1.0	.7	1.0	.8	.9	.4	.0
Not Seeking	.9	.7	1.0	1.0	.3	.4	1.4	.9	.5	.4	.0
Retired	3.7	2.9	2.9	4.6	2.9	1.5	4.6	2.6	4.4	9.6	2.7
Other	.2	.1	.2	.2	.0	.1	.2	.1	.2	.3	.0
No Report	.2	.1	.1	.1	.1	.1	.2	.3	.3	.2	.0

Sources: DOCTORAL SCIENTISTS AND ENGINEERS IN THE UNITED STATES 1973 (1975) PROFILE, Commission on Human Resources, NRC

Employer Categories. Data on the categories of employers, for NDEA Fellows sorted on the basis of field of fellowship award, are given in Table 16 for the 1973 survey and Table 17 for the 1975 survey. The format is similar to that for the preceding tables, and again the fact that the "fields unknown" group represents the oldest cohort should be noted in interpreting the table. Overall, 64.7% of the NDEA Fellows are employed in 1973 in educational institutions, which here include elementary and secondary education as well as higher education. This definition is used in order to make the categories correspond with the data available from the 1973 and 1975 Profile reports on all PhD's which are provided in Table 18.

In comparing these data with those derived from the National Faculty Directory, important differences in percentages in the educational institution category will be noted. This arises in part from the more inclusive definition used in the CR, but more importantly from the fact that in the NFD collations there were a number of persons who could not be unambiguously identified; they were put in an "other and unknown" category. In the case of the Comprehensive Roster there was no question of proper identification, although there were problems of sampling, address location, and nonresponse. The latter problems apply to all PhD's, however, and are presumed to be the same for the NDEA Fellows and others not so supported; hence the normative data from Table 18 should be fully applicable.

Time changes from 1973 to 1975 in employer categories are sufficiently large to be judged to be real, and not random variations, as far as the total of all fields combined are concerned; allowance for sampling variations must be greater for the separate fields because of the smaller numbers of cases involved. For all fields combined, the percentage in educational institutions declined from 64.7% in 1973 to 60.0% in 1975, even while the actual total numbers in academic environments increased from 823 to 991 because of the augmentation of the sample to include graduates of the years 1973 and 1974. The weighted N's were 5,551 in 1973 and 7,529 in 1975 in educational institutions, out of grand totals for the two years of 8,579 and 12,550. There was a substantial increase in the number (both unweighted and weighted) and in the proportion employed in business and industry--up from 18.3% in 1973 to 24.8% in 1975. Part of the change was due to an improvement in questionnaire and coding technique, whereby some self-employed were moved to the business/industry category. See footnote to Table 16 for details.

Turning to the separate fields, the symbols H and V have the same meaning as in the preceding tables, and one can readily note the marked field differences, corresponding in a general way to those anticipated in plans at PhD, as shown in Table 7 for NDEA Fellows and Tables 8 and 9 for the entire PhD population. In the data from the CR, over half of the NDEA engineers are employed in business and industry, 50.0% in 1973 and 59.2% in 1975 (but see footnote to Table 16 for a caveat). In other fields, the proportions in business and industry are still high, although lower than for engineering: physics (30.0% and 32.3%); chemistry (37.8% and 47.3%); and geosciences (11.2% and 16.3%); behavioral sciences subtotal (6.5% and 12.3%). As will be seen by reference to Table 18, a similar pattern of field differences in business and industry employment is apparent for the entire PhD population. An increase in this category from 1973 to 1975 is evident, but the exact extent is uncertain, due to the questionnaire and coding changes referred to above.

Primary Work Activity. As might be expected from the distribution of employer categories, and the earlier information on the Roose-Andersen ratings of insitutions of academic employment, teaching, rather than research, is the primary work activity of the largest proportion of NDEA Fellows. The data on this subject are given in Tables 19 and 20 for 1973 and 1975, respectively. There is a shift over the two year period, in proportion in teaching, which declines from 46.9% to 42.7%, and in research, which increases from 27.9% to 28.3%, in line with the greater numbers in business and industry in the later year. The percent in R & D is only a small increase, but represents substantial numbers, with the weighted N's increasing from 2,389 to 3,556. The numbers in the other categories of primary work activity are relatively small, particularly when considered within field groups, but the sum of activities in administration of research, consulting, design, development, reporting, marketing, production, and inspection--all primarily business oriented, goes from 18.6% to 22.8%--certainly a substantial increase in percentage, representing an even larger increase in actual numbers. When one turns to examination of the separate fields, the changes become even more impressive, as the changes in the direction of greater business/industry activity are concentrated largely in the EMP fields. In these fields the percentage in teaching as a primary work activity declines from 39.7% to 32.9%, while the percentage in research goes from 30.9% to 33.3%, and the set which includes administration of research, consulting, design, reporting, production, etc. increases from 25.5% to 29.9%.

Table 16

Employer Categories for NDEA Fellows in 1973 Comprehensive Roster Survey, by Field of Fellowship Award

Employer Category [1]		Field of Fellowship: Math	Phys	Chem	Earth	Engr	EMP TOTAL	Biosc	Psych	SocSc	BIO/BEH TOTAL	Hum & Prof	Educ	NONSC TOTAL	KNOWN TOTAL	UNK	GRAND TOTAL
Educational Institution	N [2]	62	33	44	22	42	203	155	42	106	303	36	44	80	586	237	823
	WN	466	219	238	154	380	1457	894	317	974	2185	268	224	492	4134	1417	5551
	H	11.3	5.3	5.8	3.7	9.2	35.2	21.6	7.7	23.6	52.9	6.5	5.4	11.9	74.5	25.5	
	V	88.8	57.6	45.9	63.6	29.5	49.3	66.9	74.2	80.4	73.4	93.4	93.7	93.5	64.0	66.7	64.7
Federal Government	N	5	4	6	3	20	38	21	2	12	35		1	1	74	34	108
	WN	34	17	43	29	189	312	100	16	120	296		5	5	613	221	834
	H	5.5	2.8	7.0	4.7	30.8	50.9	26.1	2.6	19.6	48.3		.8	.8	73.5	26.5	
	V	6.5	4.5	8.3	12.0	14.7	10.6	12.0	3.7	9.9	9.9		2.1	1.0	9.5	10.4	9.7
State/Local Government	N		1	2	1		4	6	2	2	10	1		1	15	3	18
	WN		12	13	10		35	46	9	26	81	3		3	119	20	139
	H		10.1	10.9	8.4		29.4	38.7	7.6	21.8	68.1	2.5		2.5	85.6	14.4	
	V		3.2	2.5	4.1		1.2	3.4	2.1	2.1	2.7	1.0		.6	1.8	.9	1.6
Hospitals & Clinics	N						1	8			9		1	1	10	4	14
	WN						5	43			48		2	2	50	13	63
	H						10.0	86.0			96.0		4.0	4.0	79.4	20.6	
	V						.4	10.1			1.6		.8	.4	.8	.6	.7
Other Non-Profit Organiz.	N		1	2	2	5	10	4	2	4	10		1	1	21	7	28
	WN		13	14	12	46	85	14	21	36	71		2	2	158	46	204
	H		8.2	8.9	7.6	29.1	53.8	8.9	13.3	22.8	44.9		1.3	1.3	77.5	22.5	
	V		3.4	2.7	5.0	3.6	2.9	1.0	4.9	3.0	2.4		.8	.4	2.4	2.2	2.4
Business & Industry [3]	N	3	18	29	6	73	129	28		3	31	1		1	161	54	215
	WN	17	114	196	27	644	998	166		27	193	4		4	1195	372	1567
	H	1.4	9.5	16.4	2.3	53.9	83.5	13.9		2.3	16.2	.3		.3	76.3	23.7	
	V	3.2	30.0	37.8	11.2	50.0	33.8	12.4		2.2	6.5	1.4		.8	18.5	17.5	18.3
Other, & No Report [3]	N	2	1	3	1	3	10	6	2	3	11	1	1	2	23	4	27
	WN	8	5	14	10	30	67	51	21	29	101	12	6	18	186	35	221
	H	4.3	2.7	7.5	5.4	16.1	36.0	27.4	11.3	15.6	54.3	6.5	3.2	9.7	84.2	15.8	
	V	1.5	1.3	2.7	4.1	2.3	2.3	3.8	4.9	2.4	3.4	4.2	2.5	3.4	2.9	1.6	2.6
TOTAL	N	72	58	86	35	142	394	221	58	130	409	39	48	87	890	343	1233
	WN	525	380	518	242	1289	2954	1336	427	1212	2975	287	239	526	6455	2124	8579
	H	8.1	5.9	8.0	3.7	20.0	45.8	20.7	6.6	18.8	46.1	4.4	3.7	8.1	75.2	24.8	
	V	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ includes elementary and secondary schools as well as higher educational institutions

2/ N means actual number of respondents; WN means weighted number (see text for explanation); H means horizontal percentage; V means vertical percentage.

3/ Part of the 1975 increase in Business & Industry from 1973 to 1975 is due to an improvement in questionnaire and coding procedures which had the effect of moving most of the self-employed from "Other, & No Report" to Business & Industry. The maximum possible effect, however, would be to change this category, for the grand total, from 18.3% to 19.9%; the 1975 figure of 24.8% is therefore a real increase. In the separate fields, the possible effect of this coding change varies, but, where the numbers are large enough for statistical significance it never erases the real increase shown.

SOURCE: NRC, Commission on Human Resources

Table 17

Employer Categories for NDEA Fellows in 1975 Comprehensive Roster Survey, by Field of Fellowship Award

Employer Category		Field of Fellowship: Math	Phys	Chem	Earth	Engr	EMP TOTAL	Biosc	Psych	SocSc	BIO/BEH TOTAL	Hum & Prof	Educ	NONSC TOTAL	KNOWN TOTAL	UNK	GRAND TOTAL
Educational Institution 1/	N 2/	85	44	60	30	54	273	201	62	141	404	47	46	93	770	221	991
	WN	647	396	360	218	498	2119	1443	482	1406	3331	373	207	580	6030	1499	7529
	H	10.7	6.6	6.0	3.6	8.3	35.1	23.9	8.0	23.3	55.2	6.2	3.4	9.6	80.1	19.9	
	V	81.8	51.6	39.5	63.6	26.6	45.2	62.9	69.8	77.0	69.2	91.2	93.2	91.9	59.5	61.9	60.0
Federal Government	N	6	8	8	5	20	47	28	3	13	44		1	1	92	30	122
	WN	48	85	65	40	221	459	262	17	154	433		2	2	894	256	1150
	H	5.4	9.5	7.3	4.5	24.7	51.3	29.3	1.9	17.2	48.4		.2	.2	77.7	22.3	
	V	6.1	11.1	7.1	11.7	11.8	9.8	11.4	2.5	8.4	9.0		.9	.3	8.8	10.6	9.2
State/Local Government	N		1	2	2	1	6	6	2	5	13	1	1	2	21	2	23
	WN		9	11	19	2	41	53	19	46	118	16	6	22	181	14	195
	H		5.0	6.1	10.5	1.1	22.7	29.3	10.5	25.4	65.2	8.8	3.3	12.2	92.8	7.2	
	V		1.2	1.2	5.5	.1	.9	2.3	2.7	2.5	2.5	3.9	2.7	3.5	1.8	.6	1.6
Hospitals & Clinics	N		1	5		1	7	6	15		21				28	3	31
	WN		8	31		9	48	32	113		145				193	17	210
	H		4.1	16.1		4.7	24.9	16.6	58.5		75.1				91.9	8.1	
	V		1.0	3.4		.5	1.0	1.4	16.4		3.0				1.9	.7	1.7
Other Non-Profit Organizations	N	2	3	2	2	3	12	11	4	7	22	1		1	35	6	41
	WN	17	21	13	10	35	96	79	34	69	182	14		14	292	46	338
	H	5.8	7.2	4.5	3.4	12.0	32.9	27.1	11.6	23.6	62.3	4.8		4.8	86.4	13.6	
	V	2.1	2.7	1.4	2.9	1.9	2.0	3.4	4.9	3.8	3.8	3.4		2.2	2.9	1.9	2.7
Business & Industry 3/	N	11	30	50	6	103	200	53	2	13	68	2	2	4	272	66	338
	WN	79	248	431	56	1109	1923	426	26	140	592	6	7	13	2528	590	3118
	H	3.1	9.8	17.0	2.2	43.9	76.1	16.9	1.0	5.5	23.4	.2	.3	.5	81.1	18.9	
	V	10.0	32.3	47.3	16.3	59.2	41.0	18.6	3.8	7.7	12.3	1.5	3.2	2.1	25.0	24.4	24.8
Other, & No Report 3/	N									1	1				1		1
	WN									10	10				10		10
	H									100.0	100.0				100.0		
	V									.5	.2				.1		.1
TOTAL	N	104	87	127	45	182	545	305	88	180	573	51	50	101	1219	328	1547
	WN	791	767	911	343	1874	4686	2295	691	1825	4811	409	222	631	10128	2422	12550
	H	7.8	7.6	9.0	3.4	18.5	46.3	22.7	6.8	18.0	47.5	4.0	2.2	6.2	80.7	19.3	
	V	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/Includes elementary and secondary schools as well as higher educational institutions

2/N means actual number of respondents; WN means weighted number (see text for explanation); H means horizontal percentage; V means vertical percentage.

3/See footnote to Table 16.

SOURCE: NRC, Commission on Human Resources

Table 18

Employer Categories of U.S. Doctoral Scientists and Engineers in 1973 and 1975

1930-72 UNITED STATES DOCTORAL SCIENTISTS AND ENGINEERS

18A TYPE OF EMPLOYER BY FIELD OF EMPLOYMENT FOR FULL-TIME AND PART-TIME EMPLOYED DOCTORAL SCIENTISTS AND ENGINEERS EXCLUDING POSTDOCTORAL APPOINTEES -- 1973

YEAR OF DOCTORATE AND TYPE OF 1973 EMPLOYER		FIELD OF EMPLOYMENT									
1930-72 DOCTORATES		ALL FIELDS	MATH	PHYS	CHEM	EARTH	ENGIN	BIOSC	PSYCH	SOCSC	NONSC	UNK
EMPLOYED POPULATION	N	220790	14979	16164	26736	10109	34317	53849	24565	25924	10901	3446
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
EDUCATIONAL INSTITUTIONS*	%	58.0	79.4	55.8	37.0	53.2	35.6	67.0	81.3	83.3	55.6	40.2
FEDERAL GOVERNMENT	%	8.7	4.8	15.0	5.9	19.8	9.0	11.1	4.3	5.0	7.4	5.0
STATE/LOCAL GOV'T.	%	1.6	.4	.2	.6	4.1	.7	1.8	3.9	1.6	2.4	2.0
HOSPITAL/CLINIC	%	2.5	.2	.4	.7	.0	.1	3.3	13.3	.1	.7	.6
OTHER NON-PROFIT ORGANIZATIONS	%	3.5	1.8	4.7	2.1	4.4	3.0	2.8	4.4	4.2	6.3	3.0
BUSINESS/INDUSTRY**		22.6	12.3	22.1	52.0	19.4	48.5	11.8	5.4	3.6	24.8	27.7
OTHER/NO REPORT**	%	3.1	1.2	1.8	1.7	2.1	2.4	2.2	7.4	2.1	4.8	21.3

18 B Type of Employer by Field of Employment for Full-Time and Part-Time Employed Doctoral Scientists and Engineers Excluding Postdoctoral Appointees, 1975

A. Individuals Receiving Doctorates During 1930-1974

1975 Employer	All Fields	Field of Employment									
		Math	Phys	Chem	Earth	Engr	Biosc	Psych	SocSc	Nonsc	No Report
Employed Population N	254,643	16,682	16,866	31,582	11,863	41,398	60,415	28,531	31,056	12,894	3,356
Educational Institution *	57.7%	78.7%	61.0%	38.3%	48.7%	34.7%	66.7%	58.2%	81.5%	57.6%	46.7%
Federal Government	8.3	5.2	12.4	5.2	19.1	8.9	11.1	4.2	6.3	5.2	4.2
State/Local Gov't	1.7	.2	*	.6	3.7	.8	2.1	3.9	2.2	2.4	1.6
Hospital/Clinic	2.8	.1	.5	1.0	.0	*	3.1	16.2	.1	.5	2.5
Other Non-Profit Organization	3.4	1.4	4.4	2.4	4.2	2.9	2.8	3.2	5.0	6.0	7.9
Business/Industry	25.9	14.4	21.7	52.5	24.2	52.6	14.1	14.1	4.8	28.1	29.8
Other/No Report	.2	*	.0	*	.0	*	.1	.2	.1	.2	7.3

* includes elementary and secondary schools as well as higher educational institutions

** The change from 1973 to 1975 was partly artifactual, due to changes in questionnaire and coding procedures; one effect of which was to move self-employed persons from the "Other/No Report" category to Business/Industry. The exact impact of these changes on the separate fields is uncertain, as not all of the "Other/No report" cases were in the self-employed category.

SOURCES: DOCTORAL SCIENTISTS AND ENGINEERS IN THE UNITED STATES 1973 (1975) PROFILE, Commission on Human Resources, NRC

Table 19

Primary Work Activity of NDEA Fellows in 1973 Comprehensive Roster Survey, by Field of Fellowship Award

Primary Work Activity		Field of Fellowship															
		Math	Phys	Chem	Earth	Engr	EMP TOTAL	Biosc	Psych	SocSc	BIO/BEH TOTAL	Hum & Prof	Educ	NONSC TOTAL	KNOWN TOTAL	UNK	GRAND TOTAL
Teaching	N*	56	20	32	19	37	164	94	27	87	208	30	26	56	428	172	600
	WN	423	121	170	128	330	1172	522	190	786	1498	219	126	345	3015	1010	4025
	H	14.0	4.0	5.6	4.2	10.9	38.9	17.3	6.3	26.1	49.7	7.3	4.2	11.4	74.9	25.1	
	V	80.6	31.9	32.8	52.9	25.6	39.7	39.0	44.6	64.8	50.3	76.3	53.2	65.8	46.7	47.6	46.9
Research	N	10	18	35	8	50	121	60	12	20	112	6	5	11	244	86	330
	WN	64	124	210	69	444	911	511	112	206	829	47	36	83	1823	566	2389
	H	3.5	6.8	11.5	3.8	24.4	50.0	28.0	6.1	11.3	45.5	2.6	2.0	4.6	76.3	23.7	
	V	12.2	32.7	40.5	28.5	34.5	30.9	38.2	26.3	17.0	27.9	16.4	15.2	15.8	28.3	26.7	27.9
Administration of Research	N	1	4	9	2	19	35	17	2	7	26	1	6	7	68	33	101
	WN	9	27	66	22	168	292	114	14	64	192	4	31	35	519	219	738
	H	1.7	5.2	12.7	4.2	32.4	56.3	22.0	2.7	12.3	37.0	.8	6.0	6.7	70.3	29.7	
	V	1.7	7.1	12.7	9.1	13.1	9.9	8.5	3.3	5.3	6.5	1.4	13.1	6.7	8.0	10.3	8.6
Administration, Other	N		2	2	2	3	9	7	3	6	16		1	1	26	17	43
	WN		14	12	13	19	58	31	23	61	115		6	6	179	101	280
	H		7.8	6.7	7.3	10.6	32.4	17.3	12.8	34.1	64.2		3.4	3.4	63.9	36.1	
	V		3.7	2.3	5.4	1.5	2.0	2.3	5.4	5.0	3.9		2.5	1.1	2.8	4.8	3.3
Consulting & Prof. Services	N	3	1	2	2	3	11	7	5	1	17	1	7	8	36	8	44
	WN	22	7	18	4	32	83	37	54	13	104	5	26	31	218	55	273
	H	10.1	3.2	8.3	1.8	14.7	38.1	17.0	24.8	6.0	47.7	2.3	11.9	14.2	79.9	20.1	
	V	4.2	1.8	3.5	1.7	2.5	2.8	2.8	12.7	1.1	3.5	1.7	11.0	5.9	3.4	2.6	3.2
Design & Development	N	1	7	1		31	40	2	3	1	6				46	11	57
	WN	6	42	4		294	346	11	22	3	36				382	72	454
	H	1.6	11.0	1.0		77.0	90.6	2.9	5.8	.8	9.4				84.1	15.9	
	V	1.1	11.1	.8		22.8	11.7	.8	5.2	.2	1.2				5.9	3.4	5.3
Reporting, Market., Prod., Inspection	N	1	2	3			6	5		2	7				13	6	19
	WN	1	11	20			32	36		21	57				89	40	129
	H	1.1	12.4	22.5			36.0	40.4		23.6	64.0				69.0	31.0	
	V	.2	2.9	3.9			1.1	2.7		1.7	1.9				1.4	1.9	1.5
Other, & No Report	N		4	2	2		8	9	2	6	17	1	3	4	29	10	39
	WN		33	18	6		57	75	11	59	145	12	12	24	226	60	286
	H		14.6	8.0	2.7		25.2	33.2	4.9	26.1	64.2	5.3	5.3	10.6	79.0	21.0	
	V		8.7	3.5	2.5		1.9	5.6	2.6	4.9	4.9	4.2	5.1	4.6	3.5	2.8	3.3
TOTAL	N	72	58	86	35	143	394	221	58	130	409	39	48	87	890	343	1233
	WN	525	379	518	242	1287	2951	1337	426	1213	2976	287	237	524	6451	2123	8574
	H	8.1	5.9	8.0	3.8	20.0	45.7	20.7	6.6	18.8	46.1	4.4	3.7	8.1	75.2	24.8	
	V	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* N means actual number of respondents; WN means weighted number (see text for explanation); H means horizontal percentage; V means vertical percentage.

SOURCE: NRC, Commission on Human Resources

Table 20

Primary Work Activity of NDEA Fellows in 1975 Comprehensive Roster Survey, by Field of Fellowship Award

Primary Work Activity	*	Field of Fellowship: Math	Phys	Chem	Earth	Engr	EMP TOTAL	Biosc	Psych	SocSc	BIO/BEH TOTAL	Hum & Prof	Educ	NONSC TOTAL	KNOWN TOTAL	UNK	GRAND TOTAL
Teaching	N	75	27	46	22	34	204	128	48	110	286	35	28	63	553	152	705
	WN	565	229	281	155	312	1542	916	387	1102	2405	289	114	403	4350	1015	5365
	H	13.0	5.3	6.5	3.6	7.2	35.4	21.1	8.9	25.3	55.3	6.6	2.6	9.3	81.1	18.9	
	V	71.3	29.9	30.8	45.1	16.7	32.9	39.9	55.9	60.3	49.9	70.8	51.4	64.0	42.9	41.9	42.7
Research	N	11	29	47	19	65	171	107	15	28	150	7	4	11	332	80	412
	WN	90	270	371	151	679	1561	852	116	296	1264	52	16	68	2893	663	3556
	H	3.1	9.3	12.8	5.2	23.5	54.0	29.5	4.0	10.2	43.7	1.8	.6	2.4	81.4	18.6	
	V	11.4	35.2	40.6	43.9	36.3	33.3	37.1	16.6	16.2	26.2	12.7	7.2	10.8	28.5	27.4	28.3
Administration of Research	N	2	10	12	1	25	50	22	4	12	38	3	3	6	94	38	132
	WN	17	100	102	11	248	478	139	37	122	298	31	18	49	825	327	1152
	H	2.1	12.1	12.4	1.3	30.1	57.9	16.8	4.5	14.8	36.1	3.8	2.2	5.9	71.6	28.4	
	V	2.1	13.0	11.2	3.2	13.2	10.2	6.0	5.3	6.7	6.2	7.6	8.1	7.8	8.1	13.5	9.2
Administration, Other	N		1	2	1	7	11	9	5	11	25	4	2	6	42	20	62
	WN		1	19	9	73	102	61	40	107	208	27	7	34	344	140	484
	H		.3	5.5	2.6	21.2	29.7	17.7	11.6	31.1	60.5	7.8	2.0	9.9	71.1	28.9	
	V		.1	2.1	2.6	3.9	2.2	2.7	5.8	5.9	4.3	6.6	3.2	5.4	3.4	5.8	3.9
Consulting & Prof. Services	N	5	2	3		5	15	10	11	5	26	2	10	12	53	16	69
	WN	35	22	25		44	126	77	74	63	214	9	49	58	398	104	502
	H	8.8	5.5	6.3		11.1	31.7	19.3	18.6	15.8	53.8	2.3	12.3	14.6	79.3	20.7	
	V	4.4	2.9	2.7		2.3	2.7	3.4	10.7	3.4	4.4	2.2	22.1	9.2	3.9	4.3	4.0
Design & Development	N	7	14	4	2	38	65	5	2	1	8		1	1	74	14	88
	WN	61	112	25	18	439	655	46	19	5	70		7	7	732	128	860
	H	8.3	15.3	3.4	2.5	60.0	89.5	6.3	2.6	.7	9.6		1.0	1.0	85.1	14.9	
	V	7.7	14.6	2.7	5.2	23.4	14.0	2.0	2.7	.3	1.5		3.2	1.1	7.2	5.3	6.8
Reporting, Market.,Prod., Inspection	N	1	2	9		3	15	14		4	18		1	1	34	5	39
	WN	9	17	80		33	139	129		42	171		10	10	320	29	349
	H	2.8	5.3	25.0		10.3	43.4	40.3		13.1	53.4		3.1	3.1	91.7	8.3	
	V	1.1	2.2	8.8		1.8	3.0	5.6		2.3	3.5		4.5	1.6	3.2	1.2	2.8
Other, & No Report	N	3	2	4		5	14	10	3	9	22		1	1	37	3	40
	WN	15	16	10		45	86	78	19	90	187		1	1	274	16	290
	H	5.5	5.8	3.6		16.4	31.4	28.5	6.9	32.8	66.2		.4	.4	94.5	5.5	
	V	1.9	2.1	1.1		2.4	1.8	3.4	2.7	4.9	3.9		.5	.2	2.7	.7	2.3
TOTAL	N	104	87	127	45	182	545	305	88	180	573	51	50	101	1219	328	1547
	WN	792	767	913	344	1873	4689	2298	692	1827	4817	408	222	630	10136	2422	12558
	H	7.8	7.6	9.0	3.4	18.5	46.3	22.7	6.8	18.0	47.5	4.0	2.2	6.2	80.7	19.3	
	V	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* N means actual number of respondents; WN means weighted number (see text for explanation); H means horizontal percentage; V means vertical percentage.

SOURCE: NRC, Commission on Human Resources

Table 21

Primary Work Activity of U.S. Doctoral Scientists and Engineers in 1973 and 1975

1930-72 UNITED STATES DOCTORAL SCIENTISTS AND ENGINEERS

21 A PRIMARY WORK ACTIVITY BY FIELD OF EMPLOYMENT FOR FULL-TIME AND PART-TIME EMPLOYED DOCTORAL SCIENTISTS AND ENGINEERS EXCLUDING POSTDOCTORAL APPOINTEES — 1973

YEAR OF DOCTORATE AND 1973 PRIMARY WORK ACTIVITY		FIELD OF EMPLOYMENT									
1930-72 DOCTORATES	ALL FIELDS	MATH	PHYS	CHEM	EARTH	ENGIN	BIOSC	PSYCH	SOCSC	NONSC	UNK
EMPLOYED POPULATION N	220790	14979	16164	26736	10109	34317	53849	24365	25924	10901	3446
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TEACHING %	37.0	60.6	35.3	28.2	31.5	25.0	32.8	37.7	64.3	30.5	21.0
RESEARCH %	25.2	17.5	42.2	33.7	31.0	22.7	36.3	10.7	12.4	4.9	11.6
ADMINISTRATION OF %											
-RESEARCH/DEVELOPMENT	12.8	5.6	11.7	19.2	16.9	21.3	11.4	6.7	6.2	14.7	11.7
-OTHER	5.5	3.8	1.8	3.3	4.9	4.7	3.3	8.1	6.3	22.5	11.4
CONSULTING/PROF. SERVICES %	5.1	1.7	1.0	1.2	2.6	3.4	3.2	25.3	1.8	5.7	2.1
DESIGN/DEVELOPMENT %	3.8	4.8	3.1	4.0	1.6	14.6	.8	.7	.5	2.3	1.2
REPORT/MARKETING/ % PRODUCTION/INSPECTION	1.6	.4	.5	3.0	1.5	1.6	1.4	.3	1.0	4.7	5.7
OTHER/NO REPORT %	9.1	5.7	4.5	7.4	9.7	6.7	10.8	10.5	7.5	14.7	35.2

21 B Primary Work Activity by Field of Employment for Full-Time and Part-Time Employed Doctoral Scientists and Engineers Excluding Postdoctoral Appointees, 1975

A. Individuals Receiving Doctorates During 1930-1974

1975 Primary Work Activity	All Fields	Field of Employment									
		Math	Phys	Chem	Earth	Engr	Biosc	Psych	SocSc	Nonsc	No Report
Employed Population N	254,643	16,682	16,866	31,582	11,863	41,398	60,415	28,531	31,056	12,894	3,356
Teaching	36.8%	60.7%	34.9%	28.0%	29.6%	22.3%	33.9%	38.7%	63.6%	31.3%	22.1%
Research	25.8	17.3	43.9	34.7	35.6	23.1	37.5	10.1	13.2	5.5	10.9
Administration of:											
-Research/Development	14.5	6.4	11.6	22.1	16.5	22.7	13.0	8.8	8.0	16.0	14.8
-Other	6.3	4.0	1.8	3.6	6.6	6.4	4.0	8.3	6.6	24.9	12.1
Consulting/Prof. Services	6.2	2.0	.9	1.5	4.6	4.2	4.3	29.8	2.0	5.3	6.1
Design/Development	4.5	6.9	3.5	4.4	1.5	16.7	1.1	.7	.5	1.9	1.4
Report/Marketing/ Production/Inspection	1.9	.5	.7	3.1	1.7	1.8	1.7	.5	1.7	5.7	7.4
Other/No Report	4.0	2.1	2.6	2.6	4.0	2.8	4.5	3.1	4.3	9.3	25.2

SOURCES: DOCTORAL SCIENTISTS AND ENGINEERS IN THE UNITED STATES 1973 (1975) PROFILE, Commission on Human Resources, NRC

Comparison data for the total of all PhD's in the science and engineering fields are provided in Table 21, from the 1973 and 1975 Profile reports. The pattern of shifts in primary work activity is similar only in general outline; the changes from 1973 to 1975 are not as great, possibly because a large portion of these people in the general PhD population include many who are older and in more stabilized positions. The effect of the influx of new PhD's has a correspondingly smaller effect on the general PhD population than on the younger NDEA PhD population.

Salaries. The final set of data from the Comprehensive Roster concerns salaries in 1973 and 1975, shown in Tables 22 and 23 respectively, for the NDEA Fellows, and in Table 24 for the entire science and engineering PhD population. Here the format of the tables changes in accordance with the nature of the data. Salary data are presented in terms of means and standard deviations, and also in the form of percentiles, because of the characteristic skewness of salary distributions. Usually, but not always, the mean is higher than the median in salary statistics. Within some fields, however, due to the vagaries of the distribution around the mid-point, the medians are higher than the means. This is not true of the totals in the tables shown here, as the numbers of cases are large enough to provide smooth distributions. There are five percentile points shown: the 10th, 25th, 50th (median), 75th, and 90th, to provide a comprehensive picture of the distribution within fields and for comparisons across fields. Data are given in each field for the men, and for the combination of men and women, but in only a few of the more populous fields for the women; in other fields, the numbers were too sparse for reliable statistics.

It should be noted particularly here that the data for "fields unknown" are omitted, as they would be misleading because of the cohort difference from the rest of the NDEA population, and the correlation of salary with age or time in jobs following graduation. However, the grand total, the bottom line in each of the sex categories, indicates the effect of this group, as these data show consistently higher salaries than the "known total" row, with the single exception of the 10th percentile point for women in 1973--a point based on a very small number of cases.

Examination of the data for the two salary tables for NDEA Fellows in 1973 and 1975 indicates that the mean salary for the men increased from $17,425 to $20,338; for the women the increase was from $14,438 to $16,750, and for the combined total from $17,271 to $20,115. Within each field for which reliable data are available, the men earn substantially more, and made larger percentage gains from 1973 to 1975 than did the women. In comparing with the data from the Profile reports for 1973 and 1975, which present data for the total of both sexes, it is particularly important to note that the age distribution for the NDEA Fellows is considerably lower than that for the general PhD population. The correlation of salary with age results in an appearance of lower salaries for the NDEA Fellows, but this is an artifact of the relative ages; if age were controlled, it is quite possible that the difference shown would be reversed.

Publications and Citations in the Scientific Literature. The final type of information available with respect to NDEA Fellows refers only to those who were trained in science and engineering fields or those who switched to these fields afterwards. The data to be presented are counts of publications and of citations in the scientific literature. No claim is made that these counts are adequate measures of the value of the work done by an individual; no single criterion could be considered an adequate measure of accomplishment. But it is through publications in the scientific literature that the achievements of scientists are primarily made known to the scientific community, and it is through citations to these publications that the impact of a given scientist's contributions can most conveniently be measured. In general, as a number of studies over the years by many scholars have shown, publication and citation counts correlate positively with other measures of achievement, such as winning Nobel prizes or other awards of distinction.

Table 22

Salaries in 1973 for NDEA Fellows in Comprehensive Roster Survey, by Sex and Field of Fellowship

	MEAN	S.D.	PERCENTILES				
			10	25	50	75	90
MEN							
Mathematics	$15,288	$2,820	$11,127	$12,894	$15,509	$17,170	$18,933
Physics	$15,582	3,388	11,056	13,011	15,663	17,653	19,946
Chemistry	$15,325	4,885	9,348	12,252	16,318	18,685	20,614
Geosciences	$15,728	3,583	11,361	13,477	15,684	17,158	19,340
Engineering	$18,951	3,423	15,306	16,720	18,572	20,864	23,688
EMP TOTAL	$17,044	4,012	11,707	14,940	17,114	19,436	21,837
Life Sciences	$15,101	3,680	10,633	12,749	15,657	17,581	19,603
Psychology	$15,594	2,571	11,595	14,064	16,054	17,032	18,069
Social Sciences	$16,898	5,012	11,359	13,741	16,376	18,722	22,740
BIO/BEHAV TOTAL	$15,913	4,249	11,043	13,310	16,007	17,868	20,444
Humanities&Prof.	$16,062	2,725	11,788	14,546	16,325	17,783	18,839
Education	$17,153	4,452	12,057	15,570	17,138	19,925	22,133
NONSCIENCE TOTAL	$16,469	3,507	11,834	15,098	16,569	18,228	20,674
Known Flds Total	$16,481	4,125	11,346	14,066	16,494	18,640	21,194
Unknown Fields	$20,272	6,022	14,320	17,151	19,523	22,781	26,454
GRAND TOTAL	$17,425	4,949	11,683	14,894	17,116	19,749	22,878
WOMEN							
EMP TOTAL	$13,374	$3,490	$10,127	$11,361	$13,418	$15,763	$17,400
Life Sciences	$13,453	4,360	7,297	11,140	13,760	16,807	17,821
Social Sciences	$15,502	3,598	10,856	13,153	16,172	17,650	20,300
BIO/BEHAV TOTAL	$14,389	3,846	10,260	11,925	14,700	17,250	19,550
Known Flds Total	$14,106	3,653	10,278	11,731	14,151	17,056	18,162
Unknown Fields	$16,018	5,486	7,739	13,219	16,859	20,200	22,450
GRAND TOTAL	$14,438	4,088	10,201	11,835	14,558	17,292	19,989
BOTH SEXES COMBINED							
Mathematics	$15,263	$2,816	$11,113	$12,858	$15,484	$17,163	$18,910
Physics	$15,598	3,401	11,059	13,012	15,658	17,667	21,020
Chemistry	$15,130	4,844	9,323	12,065	15,854	18,604	20,491
Geosciences	$15,698	3,558	11,357	13,467	15,650	17,089	19,322
Engineering	$18,938	3,444	15,300	16,713	18,569	20,858	23,674
EMP TOTAL	$16,974	4,034	11,629	14,764	17,046	19,385	21,794
Life Sciences	$14,983	3,754	10,533	12,598	15,567	17,503	19,565
Psychology	$15,417	2,585	11,413	13,608	15,934	16,975	17,956
Social Sciences	$16,780	4,923	11,315	13,690	16,363	18,638	22,402
BIO/BEHAV TOTAL	$15,792	4,238	10,961	13,164	15,944	17,784	20,362
Humanities&Prof.	$15,954	2,747	11,651	14,203	16,271	17,714	18,806
Education	$16,307	4,409	10,896	14,108	16,635	18,800	21,539
NONSCIENCE TOTAL	$16,105	3,557	11,369	14,167	16,390	18,033	20,434
Known Flds Total	$16,347	4,136	11,238	13,830	16,413	18,548	21,043
Unknown Fields	$20,116	6,055	14,000	17,025	19,430	22,711	26,311
GRAND TOTAL	$17,271	4,952	11,540	14,599	17,011	19,628	22,765

SOURCE: NRC, Commission on Human Resources

Table 23

Salaries in 1975 for NDEA Fellows in Comprehensive Roster Survey, by Sex and Field of Fellowship

	MEAN	S.D.	PERCENTILES				
			10	25	50	75	90
MEN							
Mathematics	$18,146	$7,903	$11,713	$14,358	$17,377	$20,101	$22,638
Physics	$18,778	4,284	12,443	15,436	19,355	21,872	24,537
Chemistry	$18,421	5,235	11,664	15,600	18,711	21,429	24,364
Geosciences	$20,792	10,221	15,968	16,757	18,245	21,774	24,617
Engineering	$22,328	4,653	18,002	19,525	21,225	25,135	28,656
EMP TOTAL	$20,216	6,186	13,576	17,099	20,007	22,678	26,097
Life Sciences	$18,577	4,377	13,434	15,877	17,995	20,883	24,446
Psychology	$17,532	3,015	13,901	16,076	17,489	18,947	20,696
Social Sciences	$19,379	5,185	14,729	16,573	18,369	21,322	25,715
BIO/BEHAV TOTAL	$18,731	4,582	13,865	16,116	18,030	20,729	24,603
Humanities&Prof.	$18,759	4,265	12,873	15,339	18,258	22,184	23,823
Education	$19,826	3,540	15,457	17,306	19,274	21,872	24,833
NONSCIENCE TOTAL	$19,122	4,060	14,219	16,554	18,566	22,153	24,437
Known Flds Total	$19,476	5,451	13,741	16,448	18,853	21,820	25,443
Unknown Fields	$23,720	6,096	17,703	19,585	22,630	26,594	31,247
GRAND TOTAL	$20,338	5,843	14,562	16,948	19,621	22,899	26,913
WOMEN							
Chemistry	$14,672	$3,752	$10,283	$12,783	$15,450	$17,450	$18,575
EMP TOTAL	$15,483	4,168	10,633	13,408	15,875	17,900	19,437
Life Sciences	$15,654	3,351	11,219	13,700	15,979	17,642	19,430
Social Sciences	$17,820	3,839	12,653	16,057	17,372	20,225	23,290
BIO/BEHAV TOTAL	$16,521	3,631	11,748	14,950	16,599	18,093	20,925
NONSCIENCE TOTAL	$16,200	3,344	11,387	13,778	16,217	18,713	20,917
Known Flds Total	$16,296	3,699	11,477	14,445	16,450	18,221	20,642
Unknown Fields	$20,619	4,330	16,472	18,336	19,644	20,932	25,833
GRAND TOTAL	$16,750	3,993	11,688	14,955	16,732	18,694	21,083
BOTH SEXES COMBINED							
Mathematics	$18,023	$7,817	$11,658	$14,290	$17,287	$19,985	$22,594
Physics	$18,768	4,317	12,400	15,409	19,316	21,856	24,563
Chemistry	$18,192	5,233	11,522	15,349	18,504	21,282	24,266
Geosciences	$20,648	10,073	15,905	16,700	18,188	21,612	24,494
Engineering	$22,297	4,668	17,974	19,489	21,192	25,118	28,641
EMP TOTAL	$20,097	6,188	13,420	16,951	19,903	22,590	26,002
Life Sciences	$18,345	4,376	13,093	15,722	17,774	20,689	24,243
Psychology	$17,266	3,083	13,412	15,816	17,301	18,773	20,414
Social Sciences	$19,218	5,085	14,342	16,508	18,183	21,200	25,497
BIO/BEHAV TOTAL	$18,513	4,545	13,499	15,990	17,847	20,543	24,393
Humanities&Prof.	$18,078	4,330	12,093	15,150	17,750	20,950	23,314
Education	$19,507	3,468	15,405	17,287	18,976	21,480	24,067
NONSCIENCE TOTAL	$18,593	4,095	13,165	15,740	18,263	21,423	23,717
Known Flds Total	$19,256	5,409	13,440	16,264	18,660	21,615	25,273
Unknown Fields	$23,618	6,070	17,620	19,500	22,500	26,386	31,168
GRAND TOTAL	$20,115	5,810	14,190	16,731	19,366	22,679	26,650

SOURCE: NRC, Commission on Human Resources

Table 24

Salaries of U.S. Doctoral Scientists and Engineers in 1973 and 1975

1930-72 UNITED STATES DOCTORAL SCIENTISTS AND ENGINEERS

24 A SALARY RANGE BY FIELD OF EMPLOYMENT FOR FULL-TIME EMPLOYED DOCTORAL SCIENTISTS AND ENGINEERS — 1973

YEAR OF DOCTORATE AND 1973 ANNUAL SALARY*		FIELD OF EMPLOYMENT									
1930-72 DOCTORATES	ALL FIELDS	MATH	PHYS	CHEM	EARTH	ENGIN	BIOSC	PSYCH	SOCSC	NONSC	UNK
FULL-TIME EMPLOYED POPULATION N	213613	14750	15832	26157	9835	33745	52323	22739	25025	10258	2949
LOWER DECILE $	14,250	13,040	13,680	14,670	13,850	16,100	13,310	14,200	13,840	13,660	13,020
LOWER QUARTILE $	16,990	16,250	16,930	17,240	16,840	18,730	16,460	16,700	16,650	17,440	17,260
MEDIAN $	20,890	19,790	21,150	21,160	20,730	22,490	19,940	20,010	20,160	22,700	22,220
UPPER QUARTILE $	25,590	24,550	25,920	25,140	25,030	27,060	24,770	24,710	25,010	29,430	28,490
UPPER DECILE $	33,750	30,610	33,320	31,160	32,290	33,110	30,590	30,290	33,150	36,660	35,330

*ACADEMIC YEAR SALARIES HAVE BEEN MULTIPLIED BY 11/9 TO ADJUST TO A FULL-YEAR SCALE.

24 B Salary by Field of Employment for Full-Time Employed Doctoral Scientists and Engineers, 1975

1975 Annual Salary	All Fields	Individuals Receiving Doctorates During 1930-1974: Field of Employment									
		Math	Phys	Chem	Earth	Engr	Biosc	Psych	SocSc	Nonsc	No Report
10th Percentile	$16,111	$15,224	$16,417	$16,585	$16,489	$18,707	$15,678	$15,655	$15,650	$14,855	$14,947
25th Percentile	18,862	17,962	19,436	19,514	18,930	21,418	18,248	18,181	18,077	18,956	18,871
50th Percentile (Median)	23,126	21,790	23,641	23,885	23,382	25,133	22,164	22,020	21,992	24,260	24,171
75th Percentile	28,568	26,742	28,768	28,933	28,673	30,072	27,559	26,850	27,702	31,883	30,763
90th Percentile	35,165	33,202	34,102	35,565	35,650	36,162	34,283	33,291	33,919	40,184	37,797

Sources: DOCTORAL SCIENTISTS AND ENGINEERS IN THE UNITED STATES 1973 (1975) PROFILE, Commission on Human Resources, NRC

Counts of Publications. The counts of publications were made from tapes secured from the Institute for Scientific Information (ISI), which regularly surveys a broad and comprehensive list of publications in the world's scientific literature. On the ISI tapes, each individual is listed by last name, and first and second initial. For this reason, persons with the same last name and initials cannot be distinguished by computer techniques. Tabulations from these tapes must therefore be limited to those persons with unique names in the CHR files, which, combining several sources, include over a half-million PhD's and MD's. Approximately half of these people have unique names, when abbreviated to conform to the ISI format. Because of slight differences in this format for the publications index, as compared with the citations index, the percentage of "unique names" varies slightly in the tables presented below, but this differences is too small to be of any practical significance and has been ignored in these tabulations. Of greater importance for some kinds of studies is the fact that the ISI data deal with first-named authors only. This fact has primary impact when the works of single individuals are being considered; in the aggregations considered here it is assumed that this limitation of the data applies equally to the various groupings, and hence that no significant bias is introduced.

Table 25 presents the general data, for all fields combined, showing the proportions of NDEA Fellows with unique names, and, of these unique-name individuals, the number and percentages with publications and citations. Means and standard deviations of the number of publications and citations are also provided. Each of these types of data is shown by cohort of graduation at the PhD level, as well as data for those who had not achieved the doctorate by 1974. It can be seen in Table 25 that the proportion with unique names was slightly under half in each case of these graduation cohort groups. The proportion of these unique-name cases with publications and with citations, however, varies systematically by cohort, as would be expected on the basis of opportunity to publish and be cited. The proportion with publications is 56.8% for the oldest cohort, those who attained the doctorate in the period 1961-1964. It drops to 45.2% for the 1965-69 cohort, to 29.6% for the 1970-74 cohort, and to 11.1% for those without doctorates.

Table 25

Statistics of Publications and Citations, Total of All NDEA Fellows by Cohort of PhD Graduation, Non-PhD's, and Total

	1961-64	1965-69	1970-74	No PhD	Total
Total NDEA Fellows	642	5303	12963	26926	45834
Number with Usable Names	264	2341	6093	11253	19951
% of Total Fellows	41.1	44.1	47.0	41.8	43.5
Fellows with Publications	150	1057	1802	1253	4262
% with Publications	56.8	45.2	29.6	11.1	21.4
Number with Citations	188	1192	1550	1276	4206
% with Citations	71.5	50.4	24.7	10.9	20.4
Mean No. of Publications	4.89	2.23	1.06	.36	.85
Mean No. of Citations	22.89	6.45	2.36	1.27	2.48

SOURCE: NRC, Commission on Human Resources

Citations. Rather surprisingly, in some cohorts, as can be seen in Table 25, the proportions with citations are higher than the proportions with publications. This occurs among the two earliest cohorts, and appears to indicate that there are citations to persons who have not published! Yet these data are deceptive for three reasons: (1) the period covered by the literature survey on which these counts were based was 1961-1972, and it is possible for citations to be made to an earlier period not covered by publication counts. The anomalous data are found only in the earlier cohorts, lending weight to the belief that this has happened, as this group would have had the highest probability of earlier publication; (2) the literature survey was less extensive in the early years of ISI coverage, and it is quite possible that citations were made to papers published in journals not included in the ISI coverage; (3) citations can be made to personal communications, as well as to published papers. Because the numbers of persons publishing and being cited in the scientific literature are relatively small percentages of the entire NDEA population, and because a significant proportion of these data are for people who have switched from nonscience fields, it seems reasonable that these three reasons combine to account for the finding of a higher rate of citation than publication for this particular group in the journals covered by the ISI survey.

Detail by Field. Publication and citation practices vary quite signficantly by field. Data by field of fellowship support are shown in Table 26; as noted earlier, those supported between 1959 and 1962, for whom field of award is unknown, must be excluded from the table. As these excluded cases are the oldest people, and because of the correlation of age (or cohort of graduation) with number of publications and citations, the data of Table 26 may have a slight negative bias--the counts may be unduly low. The differences among the fields, however, are not necessarily affected by this fact--more likely it is the typical variations in practice from field to field that account for the differences shown. Mean publication and citation counts are both shown by cohort of graduation, and also for those who have not yet attained the PhD.

For purposes of comparison, the normative data from the publications and citations counts for the whole PhD population, by the same graduation cohorts, plus one earlier cohort, are given in Table 27. It will be noted in Table 27 that the standard deviations are typically greater than the means. This rather unusual situation is due to the very high skew of the counts of publications and citations. A sizeable fraction of the PhD's never publish, a considerable number publish only one or two papers, and a relatively small fraction publish many papers and may be cited hundreds of times, particularly if their work is in the area of methodology--in whatever discipline.

Geographic Migration. To evaluate the geographic shifts associated with the NDEA Fellowships, the region in which the baccalaureate degree was earned was tabulated for each Fellows, as was the region of PhD, and the region of post-PhD location, as nearly as could be determined from the data of the Doctorate Records File. The findings of this analysis apply only to those who earned the doctorate; data on those who have not yet reached the doctorate were not available. The regions of the country were the standard census regions as follows:

1. New England: Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut
2. Middle Atlantic: New York, New Jersey, Pennsylvania
3. East North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin

Table 26

Mean Number of Publications and Citations in the 1961-1972 Scientific Literature by NDEA Fellows, by Field of Application, Sex, & Cohort of PhD

	MEN			WOMEN		
	65-69	70-74	No PhD	65-69	70-74	No PhD
MATHEMATICS						
Publications	3.4	1.0	.3		.5	.2
Citations	3.9	1.6	.8		2.1	1.3
PHYSICS						
Publications	4.2	2.5	.6	(1.0)		.9
Citations	14.1	5.0	1.4	(2.0)	(1.4)	.9
CHEMISTRY						
Publications	3.5	2.3	.7	(.4)	1.4	1.2
Citations	10.9	3.9	.6	(.1)	2.3	2.5
GEOSCIENCES						
Publications	3.5	1.7	.7		(1.0)	1.0
Citations	11.0	3.5	5.6		(1.8)	.5
ENGINEERING						
Publications	2.5	1.1	.4		(.3)	.2
Citations	4.4	2.4	2.1			.2
LIFE SCIENCES						
Publications	4.2	2.1	.5	1.3	1.3	.4
Citations	12.9	4.9	1.6	4.5	2.8	1.3
PSYCHOLOGY						
Publications	3.2	2.0	.4	(.4)	.6	.3
Citations	6.4	2.7	1.0	(1.5)	1.0	1.4
SOCIAL SCIENCES						
Publications	.4	.3	.2	(.2)	.3	.3
Citations	.8	1.3	.7	4.9	2.4	.8
HUMANITIES						
Publications	.6	.3	.3	.2	.1	.2
Citations	1.5	.8	1.3	.7	.6	1.0
EDUCATION						
Publications	.8	.4	.3	.5	.7	.5
Citations	1.4	.7	.4	.5	5.3	1.9

Parentheses surround values calculated on fewer than 10 cases.

SOURCE: NRC, Commission on Human Resources

Table 27

Publication and Citation Norms Based on
All PhD's 1960-1973, from DRF:
Means and Standard Deviations by Field, Sex, and Cohort of PhD

Publications

	MEN			WOMEN		
	60-64	65-69	70-73	60-64	65-69	70-73
MATHEMATICS						
Mean	5.2	3.4	1.1	2.3	1.8	.5
S.D.	7.2	5.7	3.4	5.7	5.1	1.6
PHYSICS						
Mean	10.5	7.1	3.5	3.9	3.5	2.4
S.D.	13.0	9.4	6.0	6.0	5.4	6.5
CHEMISTRY						
Mean	7.3	4.5	2.6	3.3	2.4	1.6
S.D.	12.0	6.7	4.7	6.5	5.1	3.7
GEOSCIENCES						
Mean	4.8	3.0	2.0	(.8)	2.8	1.2
S.D.	8.2	5.0	5.1	(1.6)	4.2	1.7
ENGINEERING						
Mean	5.1	3.3	1.5	(1.8)	1.5	1.1
S.D.	8.8	5.9	4.2	(3.6)	3.2	2.1
LIFE SCIENCES						
Mean	8.6	5.7	2.6	3.8	2.8	1.7
S.D.	12.7	8.5	5.2	7.0	5.3	3.6
PSYCHOLOGY						
Mean	4.0	2.7	1.2	1.2	1.1	.6
S.D.	7.1	5.4	3.1	3.4	3.6	2.1

Citations

MATHEMATICS						
Mean	17.2	5.4	2.0	7.7	2.5	.7
S.D.	39.5	17.3	26.5	23.0	9.2	4.1
PHYSICS						
Mean	73.2	30.2	7.7	20.3	18.4	2.5
S.D.	129.4	55.8	49.1	39.6	51.4	5.7
CHEMISTRY						
Mean	46.7	18.4	5.4	20.3	10.2	4.2
S.D.	99.9	40.3	18.6	48.4	22.7	17.1
GEOSCIENCES						
Mean	29.5	12.5	4.7	(4.1)	9.9	1.7
S.D.	57.5	29.2	16.0	(8.7)	23.7	3.4
ENGINEERING						
Mean	24.2	9.9	3.7	(4.9)	5.2	1.8
S.D.	60.2	25.0	25.8	(8.0)	10.9	7.1
LIFE SCIENCES						
Mean	50.8	22.4	5.8	28.7	14.5	4.0
S.D.	105.4	66.6	33.8	66.5	60.1	16.3
PSYCHOLOGY						
Mean	20.3	7.6	1.8	4.4	3.2	1.1
S.D.	45.9	23.4	10.0	15.3	13.4	4.9

Parentheses surround values calculated on fewer than 20 cases.

SOURCE: NRC, Commission on Human Resources

4. West North Central: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas
5. South Atlantic: Delaware, Maryland, D.C., Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida
6. East South Central: Kentucky, Tennessee, Alabama, Mississippi
7. West South Central: Arkansas, Lousiana, Oklahoma, Texas
8. Mountain: Montana, Wyoming, Colorado, New Mexico, Arizona, Utah
9. Pacific: Washington, Oregon, California, Alaska, Hawaii (plus Puerto Rico & Panama Canal Zone)

Table 28 shows the percentage regional distribution of the NDEA Fellows at each of three career stages, and shows, for comparative purposes, the same data for the PhD's in general who graduated over the same period--1960-1974. The NDEA data are on the left, the general PhD population data on the right. On each side of the page, the percentage within each region of baccalaureate is given in the left-hand column, the percentage in each region of doctorate in the center column, and the percentage in each region following the doctorate in the right-hand column. The data at the top of the table are for all regions of origin and destination, including foreign and unknown. The data in the bottom half of the page are for the persons of known U.S. origins and destinations only--excluding those whose origins were unknown or outside the United States, and those who destinations were non-U.S., as given in the Survey of Earned Doctorates, or whose geographic destinations were unknown.

The NDEA Title IV program drew very little upon foreign baccalaureate sources, as U.S. citizenship was a requirement, and only a few U.S. citizens typically earn BA degrees abroad--except, of course, those naturalized after college graduation. Correspondingly, a relatively small percentage, as compared with PhD's in general, went abroad after the doctorate. The relative percentages, as shown by Table 28 are 0.8% of NDEA Fellows with non-U.S. baccalaureates, and 3.6% going abroad after the doctorate, as compared with 13.6% and 7.9%, respectively, for PhD's in general.

Table 28

Percentage Distribution by Geographic Region at Three Career Stages, for NDEA Title IV Fellows and Total PhD Population, 1960-1974

A. Percent from Each U.S. Region, Foreign, and Unknown Source; Post-PhD Destinations

	NDEA FELLOWS			ALL U.S. PHDS		
	BA	PhD	Post-PhD	BA	PhD	Post-PhD
New England	10.1	9.3	6.4	8.3	8.8	5.8
Middle Atlantic	18.8	15.2	12.9	18.0	18.7	13.8
East North Central	18.1	18.4	13.8	17.7	23.6	13.4
West North Central	11.0	10.0	6.3	8.9	8.5	5.6
South Atlantic	10.5	14.2	13.2	8.1	10.9	11.0
East South Central	4.9	4.8	4.2	3.8	3.2	3.4
West South Central	7.7	7.9	6.3	6.8	7.0	5.6
Mountain	6.6	7.5	5.2	4.3	5.4	4.0
Pacific	11.1	12.8	10.0	9.6	13.9	10.6
U.S. TOTAL	98.7	100.0	78.2	85.4	100.0	73.1
Foreign	.8	--	3.6	13.6	--	7.9
Unknown	.5	--	18.1	1.0	--	19.0
GRAND TOTAL	100.0	--	100.0	100.0	--	100.0

B. Percentage Distributions with Foreign and Unknown Excluded

New England	10.2	9.3	8.2	9.7	8.8	7.9
Middle Atlantic	19.1	15.2	16.5	21.1	18.7	18.8
East North Central	18.4	18.4	17.6	20.7	23.6	18.3
West North Central	11.1	10.0	8.0	10.4	8.5	7.6
South Atlantic	10.6	14.2	16.9	9.5	10.9	15.1
East South Central	5.0	4.8	5.3	4.4	3.2	4.7
West South Central	7.8	7.9	8.1	8.0	7.0	7.6
Mountain	6.6	7.5	6.7	4.9	5.4	5.4
Pacific	11.2	12.8	12.8	11.2	13.9	14.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: NRC, Commission on Human Resources

The percentage with unknown baccalaureate sources was low for both NDEA Fellows (0.5%) and for the PhD total (1.0%), but the percentage with unknown post-PhD destinations was rather high for both groups (18.1% for NDEA and 19.0% for the PhD total).

When the U.S. regional distributions alone are considered, excluding the foreign and unknown sources and destinations, as shown in the bottom portion of Table 28, it may be noted that the NDEA drew less heavily on the northeastern section of the country (Regions 1, 2, and 3) as baccalaureate sources than did the PhD total (47.7% vs. 51.5%). The regional distribution of post-PhD destinations within the U.S. shows almost 3% fewer of the NDEA Fellows within the northeastern states (Regions 1, 2, and 3) than is typical of PhD's in general (42.3% vs. 45.0%). The net shift is thus a movement of about 5% of the Fellows from the Northeast to other regions; Region 5 (South Atlantic) is the largest net gainer, with 10.6% at the BA level, 14.2% at the PhD level, and 16.9% at the post-PhD level. These shifts are parallel to, but somewhat stronger than the shifts for the PhD population as a whole.